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NR. 9. A. C. JOHANSEN & KIRSTINE SMITH: INVESTIGATIONS AS TO THE EFFECT OF THE RESTRICTION ON FISHING DURING THE WAR ON THE PLAICE OF THE EASTERN NORTH SEA.

KØBENHAVN
I KOMMISSION HOS C. A. REITZEL
BIANCO LUNOS BOGTRYKKERI
1919

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INVESTIGATIONS

AS TO

THE EFFECT OF THE RESTRICTION ON FISHING DURING THE WAR ON THE PLAICE OF THE EASTERN NORTH SEA

BY

DR. A. C. JOHANSEN AND DR. KIRSTINE SMITH.

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I. About the plaice fishery in the North Sea during the war.

1. Introductory; survey of the yield of fishery.

It is a well-known fact that the long duration of the great war has caused much restriction on the fishing in most European waters, not least in the North Sea. Numerous fishermen were called into active service. Many fishing vessels were employed for military purposes during the war, for observation, mine fishing and so on, while others were prevented from carrying on fishery by maritime war operations. A most essential restriction on the fishing was caused by the numerous mines and the blocking up of great parts of the waters. To this must be added, that during the last part of the war several countries suffered from the want of oil for motor vessels, and finally, for the neutral countries, great disturbances in the fishery were caused by the fact, that the fish often could not be taken to the usual markets. The abnormal high prices during some years of the war have on the other hand stimulated the fishermen to carry on the fishery with great intensity where this has been possible. As to the plaice fishery in the North Sea, the statistics at hand show that an enormous decrease in the capture has taken place during the war. The total yield of the plaice fishery in the North Sea which in the last years before the war amounted to abt. 50 million kgs. went down to about half of it in the years 1915—17.

In Table I a survey is given of the yield of the plaice fishery in the North Sea in the years 1903—1918 for the different participating countries. With respect to Germany, Belgium, England, and Scotland the survey is incomplete.

Table I. Showing for each Country the Quantity of Plaice taken in the North Sea.[1]

	Denmark	Germany	Holland	Belgium	England	England: A_1 & B_1 (included in the preceding column)	Scotland
	Kgs.	Kgs.	Kgs.	Kgs.	Kgs.	Kgs.	Kgs.
1903	2.402.000	...	5.579.106	...	48.717.251	...	5.182.718
04	3.495.000	2.658.409	7.024.212	1.586.118	40.656.713	...	3.013.354
05	3.930.000	2.772.500	8.095.277	1.639.864	39.918.183	...	2.112.874
06	3.020.000	2.141.480	7.555.396	1.000.599	29.073.195	5.603.000	2.283.815
07	4.592.000	2.220.969	8.764.269	1.057.278	33.071.105	7.799.000	2.254.611
08	3.030.000	2.615.220	7.637.751	1.055.449	31.028.437	4.217.000	1.932.686
09	3.856.000	2.761.906	8.877.707	975.860	30.090.161	4.470.000	2.445.665
10	5.289.000	2.730.456	10.394.115	1.022.111	25.792.227	1.704.000	1.915.595
11	5.312.266	2.378.012	12.300.779	1.291.989	27.280.463	577.000	2.027.479
12	9.080.056	2.475.032	9.946.919	1.153.030	26.917.802	840.000	1.833.677
13	9.205.574	3.027.030	9.964.659	...	24.650.799	1.479.000	1.638.181
14	6.043.535	2.488.481[2]	9.466.933	...	20.508.519	2.708.000	2.470.832
15	9.819.723	...	7.828.207	...	11.558.930[3]	...	...
16	5.777.555	...	9.541.016	...	11.502.085[3]	...	...
17	2.183.881	...	12.054.914	...	9.025.484[3]	...	...
18	2.896.931	...	11.846.954	...	18.925.388[3]	...	...

[1] The yield for Norway is quite insignificant, as a rule below 100.000 kgs.

[2] According to information from Professor Henking.

[3] All plaice *landed* in England and Wales included.

2. About the fishery from Germany, Belgium, Holland, and England during the war.

The official German fishery statistics have not been within our reach for any of the years since 1914. From different reports published in German fishery papers it may however be seen, that from Germany far less has been fished in the North Sea during the war than usually.

According to the German public sale statistics for Geestemünde, Bremerhafen, Nordenham, Altona, Hamburg, and Cuxhaven, the public sale for all fish species (for landed as well as for transmitted fishery products) was as follows:

	Pfund (½ kg)	Scores	Specimens
1912	196.905.757	206.500	728.403
1913	201.105.799	241.887	754.580
1914	141.968.527	662.050	1.367.091
1915	94.068.897	33.213	140.554
1916	123.823.216	32.000	162.144
1917	55.754.537	...	122.712

These statistics comprise the fish transmitted from abroad.

That the plaice from the North Sea does also belong to the fishes which are influenced by the general decrease in the fishery products, may be concluded from the following survey which like the survey above was taken from "Mitteilungen d. deutschen Seefischerei Vereins".

The amount of plaice landed and sold in Geestemünde, Bremerhaven, and Altona in 1912—1917:

	Geestemünde Kgs.	Bremerhaven Kgs.	Altona Kgs.
1912	1.601.599	195.617	404.181
1913	1.450.473	204.573	447.214
1914	701.793	77.925	?
1915	536.219	60.966	?
1916	1.602.896	101.704	148.739
1917	918.764	90.630	359.129

It will be noticed that there is a great decrease in the capture from 1912—13 to 1914—15 and an increase in 1916, followed by a new decrease in 1917. In 1918 there has undoubtedly been an extremely great reduction in the capture, among other reasons for want of fishing apparatus which was strongly felt in Germany.

In the three towns: Geestemünde, Bremerhaven, and Altona the main portion of the plaice is landed which is captured in the North Sea by German fishermen. A not inconsiderable part is also landed in Hamburg, but statistics of the plaice landed in this town are not available for any of the years during the war.

For Belgium it may safely be concluded, that the plaice fishery in the North Sea during the later years of the war was practically stopped. Quite different we find the conditions in Holland, which is the only one of the countries bordering on the North Sea for which the catch of plaice during the war has been as great as in the years directly preceding the war.

According to Table I England's catch of plaice was decreasing in the period 1903—10. In the 4 years 1910—13 the yield kept about constant between 25 and 27 million kgs. per year, but in 1914 it went down to abt. 20.5 million kgs. The figures given in Table I for the years 1915—18 comprise all plaice landed in England and Wales. Even if we suppose that most of these plaice arise from the North Sea, the decrease must have been very heavy. The total landings amounted in the years 1915—17 to only 9—11.5 million kgs. per year.

3. Danish fishery during the war.

The Danish plaice fishery in the North Sea takes place predominantly in the northern part of the international areas A_3 and B_4. (See Chart Fig. 1.) The distribution of weight of Denmark's catch of plaice in the North Sea in the year 1910 was as follows:

A_3	B_4	A_4	B_5	C_2
71.5 %	22.5 %	1.4 %	3.7 %	0.9 %

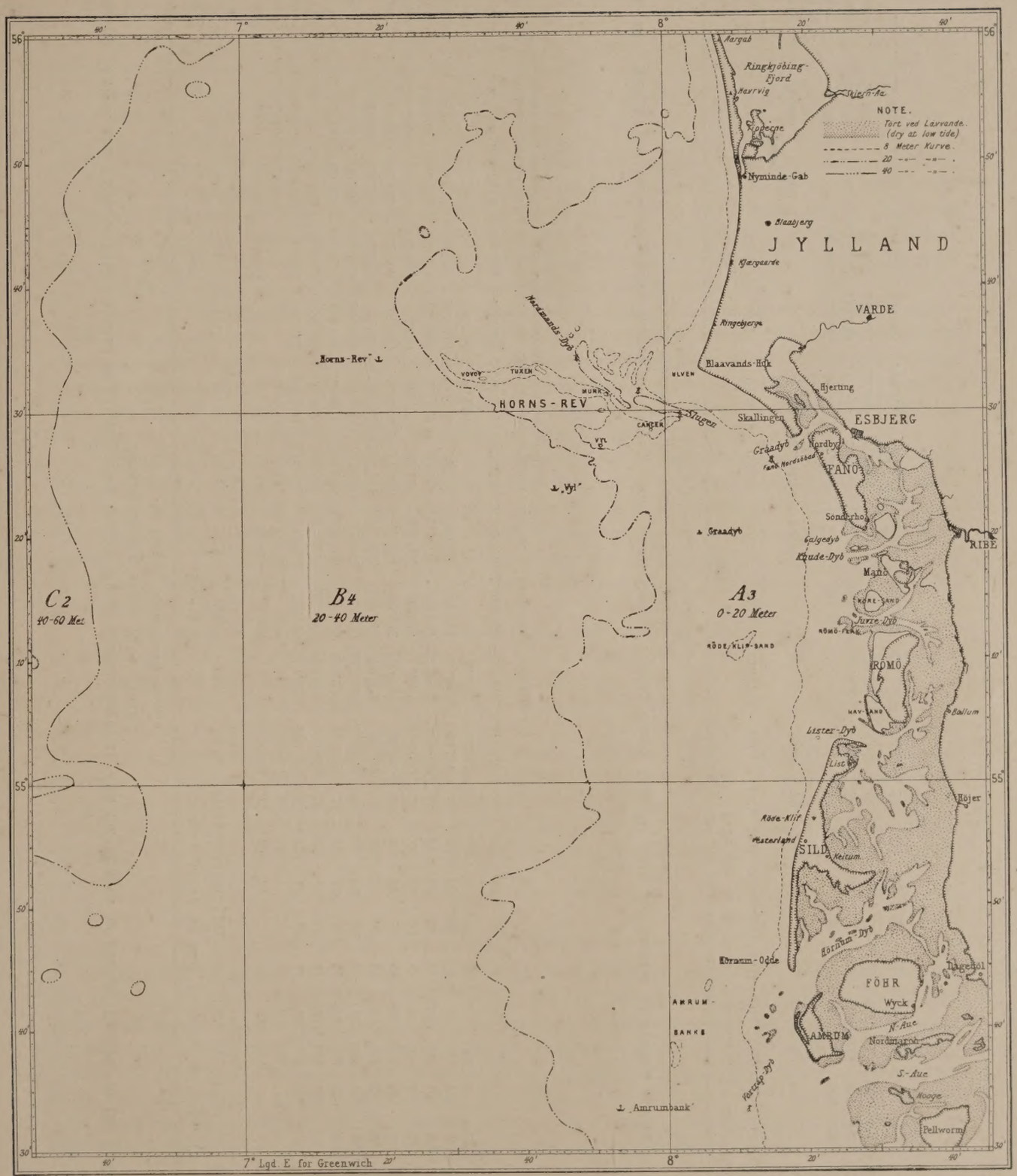

Fig. 1. The northern part of the areas A_3 and B_4 of the North Sea.

Table II. Weight and Value of Plaice landed in Esbjerg from Danish Motor Cutters, together with the Number of Fishing Cutters,[1] in the various Months of the Years 1914—1918.

(After the Danish "Fiskeri-Beretning".)

Month	Kilogs					Value in Kr.					Price per kg. in Øre					Number of Fishing Cutters				
	1914	1915	1916	1917	1918	1914	1915	1916	1917	1918	1914	1915	1916	1917	1918	1914	1915	1916	1917	1918
January	85.650	38.841	6.000	...	28.402	14.937	11.625	2.200	...	8.493	17	30	37	..	30	35	30	12	..	9
February ...	45.720	33.545	...	...	11.623	11.567	10.502	...	...	3.487	25	31	..	..	30	32	44	1	..	2
March	533.346	506.991	739.813	2.700	200.990	136.127	160.956	300.746	1.620	100.496	26	32	41	60	47	139	103	161	1	55
April	1.096.751	1.530.328	698.559	17.798	1.108.165	222.556	380.340	292.058	8.894	520.859	20	25	43	50	47	203	166	201	4	161
May.....	1.234.010	2.009.309	856.895	455.108	730.301	294.668	525.309	403.639	200.250	372.700	24	26	47	44	51	205	200	239	157	180
June	516.558	1.509.890	465.443	264.954	167.050	178.297	548.331	249.220	117.222	130.370	35	36	54	44	83	172	223	230	148	167
July.....	325.087	776.274	182.174	61.860	29.484	115.941	382.456	103.915	30.912	20.499	36	49	57	50	69	120	204	229	112	118
August	44.689	972.112	122.958	57.890	82.430	13.957	475.974	68.142	30.640	56.905	31	49	55	53	69	65	193	195	125	108
September ..	188.525	739.684	119.259	8.000	59.200	47.123	386.663	62.580	4.000	40.000	25	52	52	50	68	94	169	187	34	82
October.....	340.009	662.429	131.713	121.290	25.800	63.788	288.578	90.587	35.923	15.600	19	44	69	30	60	128	158	161	55	89
November...	103.320	677.511	46.730	225.615	55.775	27.579	201.015	28.264	63.884	40.160	27	29	60	28	72	48	125	110	48	166
December...	...	250	...	144.374	66.650	...	74	...	33.130	40.000	..	30	..	23	60	..	10	..	25	85
Total...	4.513.665[2]	9.457.164	3.369.544	1.359.589	2.565.870	1.126.540	3.371.823	1.601.351	526.475	1.349.569	25	36	48	39	53	..	..	..	..	..

[1] Including also cutters fishing for haddock. From 1916 the percentage of such cutters has strongly increased.

[2] Besides this abt. 844.000 kgs. were brought directly to German harbours.

Table III. Weigth and Value of Plaice landed in Esbjerg from small Danish Fishing Boats, together with the Number of Fishing Boats, in the various Months of the Years 1914—1918. (From March to Sept. no catch.)

(After the Danish "Fiskeri-Beretning".)

Month	Kilogs.					Value in Kr.					Price per kg. in Øre					Number of Fishing Boats				
	1914	1915	1916	1917	1918	1914	1915	1916	1917	1918	1914	1915	1916	1917	1918	1914	1915	1916	1917	1918
January	110.000	7.800	...	...	18.520	22.000	1.800	...	...	5.000	20	23	..	..	27	110	70	..	..	225
February ...	...	...	...	...	13.011	...	...	...	...	3.513	..	..	..	..	27	..	..	..	..	92
October.....	8.500	...	747.998	52.845	64.900	1.700	...	448.798	13.737	35.705	20	..	55	26	54	35	..	203	225	230
November...	125.000	170.900	1.437.340	153.210	112.794	25.000	47.840	862.404	39.828	56.397	20	28	60	26	50	112	139	203	225	200
December...	50.000	...	31.800	248.413	31.680	10.000	...	12.720	69.556	19.007	20	..	40	28	60	102	..	203	225	290
Total...	293.500	178.700	2.217.138	454.468	240.905	58.700	49.640	1.323.922	123.121	119.622	20	28	60	27	50	..	..	..	..	..

Of the plaice captured by Danish fishermen in the North Sea more than 90 % are usually landed in Esbjerg. The capture takes place mainly from motor cutters where the Snurrevaad is employed as fishing apparatus. It will be seen from Table II that the fishing takes place quite predominantly in the months March—October. In the coastal waters in the neigbourhood of Esbjerg the fishing takes place from small open boats, and is almost entirely carried on in the months October, November and December (Table III). Concerning the course of the Danish plaice fishery in the North Sea some remarks follow here as a further explanation of the returns in the different years of the war.

1914. The first half of the year 1914 was rather normal with regard to the fishing in the North Sea, but the outbreak of the war caused important changes in the sale conditions. In the first 3—4 weeks after the beginning of the war the export abroad was stopped, consequently the prices went down. During autumn the export conditions improved without becoming normal however. The total yield of the Danish plaice fishery in the North Sea amounted in 1914 to abt. 6 million kgs. against abt. 9 millions in each of the preceding years: 1912 and 1913.

1915. In the beginning of the year 1915 the export conditions improved, and by the increasing demand on the goods the prices rose considerably. The Danish plaice fishery in the North Sea has for a long series of years almost entirely been based on the landing of living fish, and the majority of the fish lacking vitality was formerly thrown overboard. Owing to the high prices in 1915 it was considered advantageous to land also dead fish in summer. These were kept on ice, the vessels being provided with ice rooms. The total yield of the Danish plaice fishery in the North Sea rose higher than ever before, amounting to 9.800.000 kgs.

1916. The year 1916 became a unique year in the history of the Danish fishery. The Germans paid fancy prices for fishing products, and this encouraged the Danish fishermen to carry on the fishing with great energy where it was possible. The total yield of the Danish fishery amounted in this year to abt. 58 million Kr. (3.2 mill. £) against abt. 17 million Kr. in the last years before the war. The German demand was however not so great on plaice as on cod and haddock. The capture of plaice in the North Sea was consequently to a great extent abandoned for the capture of the named round-fishes. The total yield of the Danish plaice fishery in the North Sea amounted in this year to abt. 5.778.000 kgs.

In the autumn of 1916 Germany commenced to regulate her import of fish through a "Centraleinkauf", by which maximum prices were fixed for first-class goods. In this way the prices were reduced, yet the price level was persistently far above the level before the beginning of the war.

1917 and 1918. About the middle of December 1916 England and the Allied countries stopped the import of all fishing articles (oil, cotton etc.) to Denmark. Moreover a far more extensive blocking by mines was effected during the two last years of the war than previously. In the first years of the war no mines were laid out in the south-eastern part of the North Sea north af Graa Deep and Horns Reef, but from February 1917 the minefields were extended northwards along the west-coast of Jutland till abt. 56° N. lat. and westwards till about the Dogger Bank. Through these measures the Danish fishery received a hard blow in the years 1917 and 1918. In 1917 the yield of the Danish plaice fishery in the North Sea was only abt. 2,184,000 kgs. and in 1918 only abt. 2.897.000 kgs. against abt. 9 million kgs. in each of the two last years preceding the war.

4. Total yield of the plaice fishery in the areas A_3 & B_4.

As our investigations about the size of plaice landed from the North Sea especially concern the northern part of the areas A_3 & B_4, betwen 54°30′ and 56°0′ N. lat., it would be of interest to know approximately the yield of the plaice fishery in that part of the areas, during the war and for a series of the preceding years. Statistics about the total catch in this region are however not available, but we get an idea about the size of it by adding the total yield of the Danish plaice fishery in the North Sea to the total yield of the English plaice fishery in the areas A_3 & B_4 (see Table I). Of the total yield of the Danish plaice fishery in the North Sea only a few per cent arise from other areas than the named ones, and the English yield from A_3 & B_4 mainly originates from the northern part of these areas (N of 54° 30′ N. lat.). By adding the named Danish and English yield we get the following result:

Danish & English catch of plaice in the areas A_3 & B_4[1].

1906.....	8.623.000 kgs	1913.....	10.685.000 kgs
1907.....	12.391.000 -	1914.....	8.752.000 -
1908.....	7.247.000 -	1915.....	9.820.000 -
1909.....	8.326.000 -	1916.....	5.778.000 -
1910.....	6.993.000 -	1917.....	2.184.000 -
1911.....	5.889.000 -	1918.....	2.897.000 -
1912.....	9.920.000 -		

It appears from this survey that still in the years 1914 and 1915 the yield of the plaice fishery in the northern part of A_3 & B_4 was about normal. In 1916 we notice a decrease, and in the years 1917 and 1918 the yield was not more than $^1/_4$ and $^1/_3$ respectively of the normal yield.

In the English catch from A_3 & B_4 the years 1906—09 show a much higher yield than the years 1910—12. According to A. T. MASTERMAN[2] this is due to a smaller amount of fishing in the last series of years. Probably the relatively small English yield in 1913 and 1914 as compared with the yield in the years 1906—09 is also due to a smaller amount of fishing. We may then safely conclude that in the period 1910—1918 there has been captured and wasted a much smaller amount of marketable and unmarketable plaice by steam-trawlers in the northern part of the areas A_3 & B_4 than in the preceding period.

From Germany and Holland fishing for plaice also takes place in the northern part of A_3 & B_4 (N. of 54°30' N. lat.). The yield of this fishery is not known, but as far as Germany is concerned it hardly amounts to more than 1 million kgs. per year under normal conditions, and as regards Holland the yield is much smaller. It is beyond doubt that there has been fished far less from these countries in this region during the war than in the years immediately preceding the war.

II. Statistical investigations concerning the length of plaice landed in Esbjerg (Jutland).

1. Source of the statistics.

From three different periods measurements are at hand of samples of plaice landed in Esbjerg from the North Sea, namely from the years 1904—06, 1916 and 1919. The first series of measurements were thus undertaken some years before the great war, the second in the middle of the war, and the third shortly after the end of the war. The results of the measurements in 1904—06 were published in "Meddelelser fra Kommissionen for Havundersøgelser", Serie: Fiskeri, Vol. III No. 8. 1910[3] while the results of the measurements in 1916 and 1919 will be found in Table XXI of this paper. The measurements were carried out under the supervision of the fishery officials.[4] With regard to the selection of the samples for measurement we have tried to select these in a way tending to make the material as representative as possible. The samples were always in greatest number taken from catches from those areas where most vessels were fishing at a given time. The plaice landed in Esbjerg are almost always alive, being kept in a pond. The fish landed are not sorted for sale. As the prices are highly dependant on the average weight of the fish, the fishermen will know this to a great approximation (weight per score). From the pond is taken, by means of catchers, a random sample of living fish for measurement, as a rule 100—150 specimens, and the entire sample measured is weighed (in 1919). In the measurements of length fractions of centimeters are discarded, so that, for instance, all

[1] We suppose that there was no catch of plaice from England in A_3 & B_4 in the years 1915—1918.

[2] A. T. MASTERMAN: Report on the Plaice Fisheries of the North Sea. (Parts I and II.) Board of Agriculture and Fisheries. Fishery Investigations Ser. II Vol. II Nr. 1. London 1915.

[3] A. C. JOHANSEN: Bericht über die dänischen Untersuchungen über die Schollenfischerei und den Schollenbestand in der oestlichen Nordsee etc. Kbhvn. 1910.

[4] For the valuable work yielded by the fishery officials we owe a thank to Fiskeridirektør F. V. Mortensen and Fiskeribetjent Tæbring.

measurements between 27 and 28 cm are put down as 27 cm[1]. As mentioned before the landed fish are not sorted according to size after landing before the sale, but a sorting takes place directly after the capture before the fish is put into the pond. By this sorting the number of the landed specimens of less than 27 cm of length is as a rule influenced. The small fish which it is either unlawful to land[2] or which it does not pay to land are thrown overboard.

2. Preliminary inquiry on the frequencies of length for A 3.

As it might be expected from what was stated in I under 3 concerning the relative yield of the Danish fishery in the various areas, the samples measured arise quite predominantly from the area A 3. Besides this B 4 is represented so far as to allow some conclusions to be drawn from the measurements, while the samples from C 3 and other areas are too few and scattered to be of any consequence.

From 1919 we have only been able to publish and work out statistically the measurements made till the end of June. The chief interest will therefore concern the measurements from A 3 taken during the months April, May, and June, for which we have material at hand that allows a comparison for each month in the three periods 1904—1906, 1916 and 1919. For a preliminary inquiry we have simply added all the samples taken in the same month, and for the whole group the frequency per 1000 of plaice has then been calculated for each cm of length. The results together with the differences between corresponding frequencies for different years are given in Table IV.

It will be seen from this table that, while in the period 1904—1906 and in April 1916 the number of plaice under 27 cm of length was abt. 42 per cent of the total sample, it has for the rest of the periods represented in the table declined to somewhat below 30 per cent. Whether this reduction of the relative frequency of plaice under 27 cm is due to a corresponding reduction in the catches, or whether some change is likely to have taken place in the way in which the undersized plaice are discarded will be discussed in a following chapter.

Regarding the columns containing the differences of frequencies, we find that for sizes over 29 cm they are with few and not important exceptions negative all of them; that is to say, the relative frequencies in the samples

[1] In the values of the average lengths in Tables IV and XXI 0.5 cm therefore has to be added.

[2] The Danish size-limit for plaice landed in Esbjerg has in the course of time varied a little. The Danish fishery law of April 5. 1888, which was in force from Jan. 1. 1889 to November 16. 1907 prohibited the sale of plaice of less than 8 Danish inches (20.9 cm) from the tip of the snout to the base of the caudal fin, corresponding to a total length of abt. 25.6 cm. The landing of smaller fish for the personal use of the fishermen was however allowed. The fishery law of May 4. 1907, which was in force from November 16. 1907 till December 26. 1917, retained the minimum of 25.6 cm for most Danish waters, and the sale as well as the landing of plaice below this size was prohibited. Some exceptional provisions were however inserted, of which the following provision concerns the fish landed in Esbjerg.

"The Minister for the Board of Agriculture *(Landbrugsministeren)* has in his power to reduce the size-limit for 4 months of the year for plaice landed in Esbjerg to 170 mm from the tip of the snout to the base of the caudal fin, 209 mm in total length, in which case he will have further to regulate the sale and export of these fish".

The right with which the Minister for the Board of Agriculture was endowed, was in the year of 1916 used so, that the size-limit was fixed to 184 mm from the tip of the snout to the base of the caudal fin or abt. 226 mm total length in the period from March 4. till April 4. and from October 15. till December 31. — The great majority of the plaice landed in Esbjerg are however captured in the period from April to October (see Table II), and the measurements undertaken were only carried on within this period. — The measurements in the two periods 1904—1906 and 1916 were thus undertaken at a time when the same size-limit was in force for Esbjerg, namely a size-limit of 25.6 cm total length. As quoted above it was however only the sale of under-sized fish that was forbidden in the period 1904—06, not the landing of such fish. The new Danish sea-fishery law of June 2. 1917, which came into force December 26. the same year, fixed the size-limit for plaice to 210 mm from the tip of the snout to the base of the caudal fin or to a total length of abt. 257 mm; to this was added in the law's § 15 the following important regulation:

"Into Esbjerg, Ringkøbing, Lemvig, and Thyborøn harbours, as well as on the coasts of the North Sea south of Tversted Bn., it is allowed to land plaice captured in the North Sea of a minimum size of 185 mm from the tip of the snout to the base of the caudal fin, abt. 225 mm in total length, in the time from October 1. till February 28. (29); and for the rest of the year the size-limit is fixed to 195 mm from the tip of the snout to the base of the caudal fin, abt. 240 mm in total length, for direct export abroad. About this, further regulation can be given by the Minister for the Board of Agriculture".

Our measurements in 1919, the results of which are published in Table XXI, were carried out in the time from April to June, when a size-limit of 24 cm for the total length was in force. The size-limit was thus somewhat lower in 1919 than in the two preceding periods of measurement: 1904—06 and 1916.

Table IV. Frequency of Length per 1000 of Plaice and Difference between Frequencies for the same Month in Different Years for Area A3.

Month	April						May						June						Month
Year	1904—1906	1916	1919	1904—1906 & 1916	1916 & 1919	1904—1906 & 1919	1904—1906	1916	1919	1904—1906 & 1916	1916 & 1919	1904—1906 & 1919	1904—1906	1916	1919	1904—1906 & 1916	1916 & 1919	1904—1906 & 1919	Year
	Freq. from 12 samples from aver. depth 15 m	Freq. from 32 samples from aver. depth 11 m	Freq. from 38 samples from aver. depth 8 m	Diff. of Freq.	Diff. of Freq.	Diff. of Freq.	Freq. from 60 samples from aver. depth 15 m	Freq. from 32 samples from aver. depth 14 m	Freq. from 205 samples from aver. depth 8 m	Diff. of Freq.	Diff. of Freq.	Diff. of Freq.	Freq. from 18 samples from aver. depth 17 m	Freq. from 7 samples from aver. depth 16 m	Freq. from 110 samples from aver. depth 15 m	Diff. of Freq.	Diff. of Freq.	Diff. of Freq.	
Length cm																			Length cm
22	..	..	..	..	..	..	..	..	0.1	..	..	..	..	..	..	..	..	..	22
23	1	..	0.4	+ 1	..	..	4	..	9	+ 4	— 9	— 5	14	..	12	+ 14	— 12	+ 2	23
24	29	2	14	+ 26	— 12	+ 15	37	..	31	+ 37	— 31	+ 5	50	..	46	+ 50	— 46	+ 4	24
25	152	192	115	— 40	+ 77	+ 37	150	130	71	+ 20	+ 59	+ 79	139	140	100	0	+ 40	+ 39	25
26	249	215	137	+ 34	+ 78	+ 112	220	166	122	+ 53	+ 45	+ 98	229	158	137	+ 71	+ 21	+ 92	26
27	201	194	143	+ 7	+ 51	+ 58	204	155	151	+ 50	+ 4	+ 53	177	165	159	+ 13	+ 5	+ 18	27
28	165	157	149	+ 8	+ 8	+ 15	149	135	150	+ 14	— 15	— 1	123	136	132	— 13	+ 5	— 9	28
29	101	95	135	+ 6	— 40	— 34	107	120	122	— 13	— 2	— 15	93	114	109	— 22	+ 5	— 16	29
30	49	68	110	— 19	— 42	— 61	61	93	102	— 33	— 8	— 41	60	96	81	— 35	+ 14	— 21	30
31	28	37	79	— 9	— 43	— 51	32	74	74	— 42	0	— 42	45	58	56	— 13	+ 2	— 11	31
32	11	16	51	— 5	— 35	— 40	20	50	52	— 29	— 2	— 32	28	42	50	— 14	— 7	— 21	32
33	8	9	31	— 1	— 22	— 23	8	30	37	— 22	— 6	— 29	16	28	34	— 13	— 6	— 19	33
34	3	5	23	— 2	— 18	— 20	5	21	27	— 16	— 6	— 22	9	25	28	— 16	— 3	— 19	34
35	3	5	9	— 2	— 3	— 6	2	11	19	— 9	— 8	— 17	6	16	20	— 10	— 4	— 15	35
36	..	1	1	— 1	0	— 1	2	8	11	— 6	— 4	— 10	4	13	13	— 9	— 1	— 10	36
37	..	1	1	— 1	+ 1	— 1	0.5	4	9	— 5	— 5	— 8	2	5	8	— 2	— 3	— 5	37
38	..	0.3	0	0	0	..	0.2	2	5	— 2	— 2	— 4	2	2	6	0	— 4	— 4	38
39	..	1	0.4	— 1	0	..	0.4	1	4	..	— 3	— 3	2	0	4	+ 2	— 4	— 2	39
40	..	1	..	— 1	+ 1	..	0.1	0.3	2	..	— 2	— 2	1	3	2	— 2	+ 1	— 1	40
41	..	..	..	..	..	..	..	..	1	..	— 1	— 1	..	..	1	..	— 1	— 1	41
42	..	..	..	..	..	..	..	..	1	..	— 1	— 1	..	..	0.4	..	..	..	42
43	..	..	..	..	..	..	..	..	0.0	..	..	..	..	..	0.2	..	..	..	43
44	..	..	..	..	..	..	..	..	0.0	..	..	..	..	..	0.1	..	..	..	44
45	..	..	..	..	..	..	..	..	0.0	..	..	..	..	..	..	..	..	..	45
46	..	..	..	..	..	..	..	..	0.0	..	..	..	..	..	..	..	..	..	46
47	..	..	..	..	..	..	..	..	0.0	..	..	..	..	..	..	..	..	..	47
48	..	..	..	..	..	..	..	..	0.0	..	..	..	..	..	..	..	..	..	48
49	..	..	..	..	..	..	..	..	0.1	..	..	..	..	..	..	..	..	..	49
50	..	..	..	..	..	..	..	..	0.0	..	..	..	..	..	..	..	..	..	50
51	..	..	..	..	..	..	..	..	0.3	..	..	..	..	..	..	..	..	..	51
under 27	431	410	267	+ 21	+ 143	+ 164	410	296	233	+114	+ 63	+176	432	298	295	+134	+ 2	+137	under 27
over 30	103	145	306	— 42	— 161	— 203	130	294	343	—164	— 49	—212	175	297	305	—122	— 8	—130	over 30
Average Length	27.13	27.35	28.35	..	..	..	27.26	28.33	28.77	..	..	..	27.42	28.35	28.47	..	..	..	Average

show for each single cm increasing values from year to year. The difference is perhaps found still more striking when we consider the line of the table giving the sum of frequencies over 30 cm. This frequency has increased from 103—175 per mille in 1904—1906 till 145—297 in 1916 and this again till 305—343 per mille in 1919. The average length given in the bottom line shows a corresponding variation. Now it is clear that this rise in the number of large plaice and in the average length may be partly due to a different sorting of the plaice, and to what extent this is the case can only be elucidated by examining separately that part of the samples which is not influenced by any sorting. We see from Table IV that the maximum frequency is found at 26 or 27 and in a single case between 27 and 28 cm. We therefore assume that, when we consider frequencies of length over 27 cm, their relative values would approach those occurring in the stock of fish on the grounds when due regard could be paid to the selecting influence of the nets. This influence is not so well elucidated that it can be taken into consideration in our calculation, but fortunately we may assume that the selection has worked in the same way in all the catches, so that if the catches do not, even for plaice over 27 cm, give a true picture of the stock on the grounds, the picture is always foreshortened in the same way.

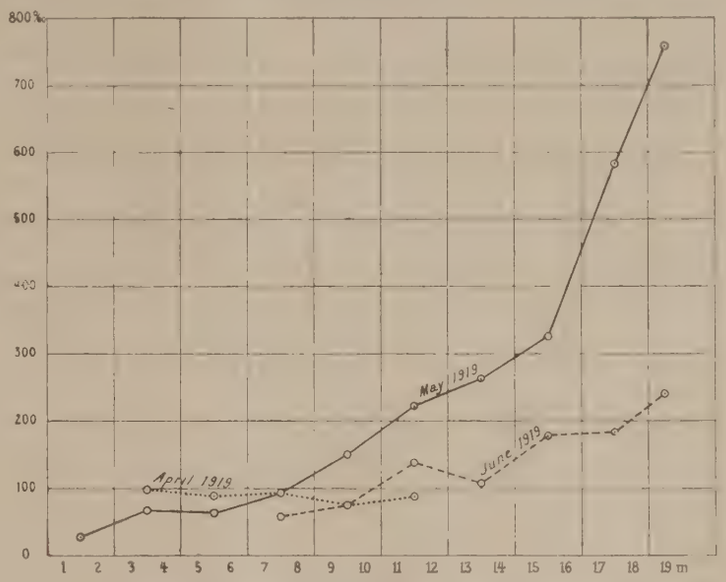

Fig. 2. Number of Plaice over 33 cm per 1000 of Plaice over 27 cm for varying Depths in A_3.

3. Variation of length according to depth of the fishing-place.

In Table IV the average depths of the grounds from which the samples have arisen are given; it will be seen that the depths decrease from year to year. It is therefore of essential interest to investigate how the frequency of large plaice at a given time varies with the depth. From 1919 a material from A_3, consisting of 206 samples for May, 110 for June, and 38 for April, are at hand, which is suitable for that purpose. In these samples only plaice over 27 cm are considered, and for such it has been calculated how many plaice out of 1000 are larger than 33 cm. The results have been arranged in groups for each 2 meters of depth for which we have found the mean values given in Table V.

Table V. Number of Plaice over 33 cm per 1000 of Plaice over 27 cm for varying Depths in A_3.

(Number of samples in brackets.)

Depth in m	under 2.5	2.5—4.5	4.5—6.5	6.5—8.5	8.5—10.5	10.5—12.5	12.5—14.5	14.5—16.5	16.5—18.5	18.5—19.5
April 1919.....	...	99 (3)	89 (9)	91 (7)	74 (14)	89 (4)	...	15 (1)		
May —	28 (7)	68 (28)	63 (32)	91 (57)	150 (37)	221 (27)	262 (6)	325 (7)	582 (3)	758 (3)
June —	...	...	...	58 (3)	75 (2)	138 (14)	106 (30)	178 (23)	184 (26)	240 (12)

It will be seen from Fig. 2, in which the results of this table are represented, that in May the percentage of large plaice is quickly increasing for depths over 8 m. For April no variation can be pointed out from the small material at hand, while for June the number of large plaice does increase much more showly with the depth than in May.

It is evident from Table V that we can not expect for instance 32 samples from May 1916 all taken from depths over 8 m, as we actually have them, to show the same distribution of frequencies as the 206 samples from May 1919 since a great part of these samples are taken from depths below 8 meters. To be able to make a fair com-

parison it will therefore be necessary to make use of smaller areas in which the depth varies less. We have chosen to subdivide A_3 by the 8 meter curve, partly because the number of large plaice in May, when the variation is most pronounced, begin to increase quickly about that depth, and partly because in several periods of measurement that depth is the limit below which none or very few samples are taken, so that this subdivision is convenient for the present observations. We call the part of A_3 which is shoaler than 8 m $A_{3,a}$ and the deeper part $A_{3,b}$. We shall more closely discuss Table V under 4.

4. Distribution of frequencies of lengths over 27 cm for A_3.

Quite apart from the difficulties which the possibility of different methods of sorting and the varying position of the fishing-places present to us when we endeavour to interpret the results given in Table IV, it is a drawback when a table like that is calculated in a way that does not make possible the calculation of an empiric standard deviation. In fact we can only very vaguely judge, whether a deviation found between different years is due to inaccuracy in the average values, which would disappear when the number of samples had been increased, or whether the deviation is essential. In calculating tables for the areas $A_{3,a}$ and $A_{3,b}$, separately, representing the relative frequencies of plaice for each cm of length over 27 cm in proportion to all plaice over this size, we have made up these deficiencies of Table IV. The calculation has been carried out in this way, that for each sample the frequencies of plaice over 27 cm of length have been calculated per 1000 of individuals. We can then treat the frequencies of a certain length over 27 cm occurring in different samples as repeated observations, we can find their mean value and standard deviation and the standard deviation of the mean. In Tables VI—VIII these mean frequencies and their standard deviations are given for each of the months April, May, and June in the three periods of measurement. The tables further give the differences between corresponding frequencies in different years and the standard deviation of the differences. The bottom line contains the frequencies of plaice over 33 cm with standard deviation directly calculated. A graphical representation of the frequencies for each cm of length in area $A_{3,b}$ is given in Figs. 3, 4 and 5. From $A_{3,a}$ very few samples are at hand except in April and May 1919. We shall discuss the results for each month separately.

For May a very good material has been available from $A_{3,b}$ in all the three periods of measurements. Fig. 4 and Table VII show a great increase in the relative frequencies of large plaice from 1904—1906 to 1916 and an as much pronounced increase from 1916 to 1919. During the first interval the relative frequency of plaice over 33 cm has been trebled, and during the later period again more than doubled. The st. ds. of the differences prove that the increase is beyond doubt. In comparing 1904—1906 with 1916 we find that the differences, with exception of that for 29 cm which is in the neighbourhood of the point of intersection of the two frequency-curves, are from 3 to 5 times their st. ds. The differences between 1916 and 1919 are especially great for plaice over 33 cm, and we find several new size-groups represented in 1919 which had hitherto been beyond the sizes measured.

From $A_{3,a}$ we have for comparison 2 samples from 1905 against 123 from 1919. They differ in the same direction as the plaice in $A_{3,b}$, although the samples from $A_{3,a}$ in 1919 do not contain very large plaice. The two samples from 1905 are however too slender a basis for any conclusions.

The difference in the composition of samples from $A_{3,b}$ and $A_{3,a}$ in 1919, partly dealt with under 3, is further elucidated by Table VII. It is evident that the reality of a difference is beyond doubt; for total frequency over 33 cm we find for instance in $A_{3,b}$ 233 ± 24 and in $A_{3,a}$ 75 ± 6, between which the difference is 158 with the st. d. 25.

When we compare the frequencies for $A_{3,a}$ in 1919 with those for $A_{3,b}$ in the earlier years, we find for $A_{3,b}$ in 1916 that it is probable that the plaice in that area has been somewhat larger than those from $A_{3,a}$ in 1919, but only for one size-group viz. 28 cm the deviation exceeds twice its st. d. For $A_{3,b}$ in 1904—1906 there is however no doubt that the plaice taken from the average depth 15 m are much smaller than those taken from the average depth of 6 m in area $A_{3,a}$ in 1919.

Table VI. Frequency of Length per 1000 of Plaice over 27 cm and Difference between Frequencies for Different Years with their Standard Deviations. April.—Area A_3.

Area	$A_{3,b}$ (depth 9—19 m)						$A_{3,a}$ (depth 3—8 m)		
Year	1904—1906	1916	1919	1904—1906 & 1916	1916 & 1919	1904—1906 & 1919	1916	1919	1916 & 1919
Length cm	Frequency from 12 samples from aver. depth 15 m	Frequency from 28 samples from aver. depth 11 m	Frequency from 19 samples from aver. depth 10 m	Diff. of Freq.	Diff. of Freq.	Diff. of Freq.	Frequency[1] from 4 samples from aver. depths 7.5 m	Frequency from 19 samples from aver. depth 6 m	Diff. of Freq.
27	370 ± 37	332 ± 15	234 ± 24	+ 38 ± 40	+ 98 ± 28	+136 ± 44	399 (± 49)	185 ± 22	+214 (± 53)
28	279 ± 23	267 ± 13	218 ± 16	+ 12 ± 26	+ 49 ± 20	+ 61 ± 28	321 (± 24)	196 ± 11	+125 (± 26)
29	162 ± 18	163 ± 8	185 ± 11	— 1 ± 19	— 22 ± 13	— 23 ± 23	125 (± 18)	186 ± 8	— 61 (± 19)
30	85 ± 15	118 ± 9	133 ± 11	— 33 ± 18	— 15 ± 14	— 48 ± 19	56 (± 20)	156 ± 9	—100 (± 21)
31	53 ± 11	61 ± 7	98 ± 11	— 7 ± 13	— 37 ± 13	— 45 ± 16	51 (± 27)	109 ± 12	— 58 (± 29)
32	22 ± 7	23 ± 4	57 ± 7	— 1 ± 8	— 34 ± 8	— 35 ± 10	44 (± 14)	76 ± 7	— 33 (± 15)
33	13	14	30	— 1	— 17	— 17	0	47	— 47
34	8	8	29	+ 1	— 21	— 21	4	30	— 25
35	6	8	9	— 1	— 1	— 2	..	13	— 13
36	..	2	2	— 2	— 1	— 2	..	2	— 2
37	..	2	2	— 2	0	— 2	..	..	..
38	..	1	0	— 1	+ 1	0	..	..	..
39	..	1	1	— 1	0	— 1	..	..	..
40	..	1	..	— 1	+ 1	..	..	..	..
over 33	28 ± 11	36 ± 7	74 ± 13	— 7 ± 13	— 38 ± 15	— 46 ± 19	4 ± 29	92 ± 13	— 87 (± 31)

[1] The st. d. of this frequency is calculated under the assumption that the st. d. of the frequency in a sample has been the same in 1916 as in 1919.

Table VII. Frequency of Length per 1000 of Plaice over 27 cm and Difference between Frequencies for Different Years with their Standard Deviations. May.—Area A_3.

Area			$A_{3,b}$ (depth 9—19 m)				$A_{3,a}$ (depth 1—8 m)		
Year	1904—1906	1916	1919	1904—1906 & 1916	1916 & 1919	1904—1906 & 1919	1905	1919	1905 & 1919
Length cm	Frequency from 58 samples from aver. depth 15 m	Frequency from 32 samples from aver. depth 14 m	Frequency from 83 samples from aver. depth 11 m	Diff. of Freq.	Diff. of Freq.	Diff. of Freq.	Frequency[1] from 2 samples from aver. depth 6 m	Frequency from 123 samples from aver. depth 6 m	Diff. of. Freq.
27	348 ± 13	229 ± 19	161 ± 13	+119 ± 23	+ 68 ± 23	+187 ± 19	393 (± 76)	241 ± 10	+152 (± 77)
28	249 ± 9	197 ± 12	163 ± 10	+ 52 ± 15	+ 34 ± 16	+ 86 ± 14	277 (± 48)	228 ± 6	49 (± 48)
29	177 ± 6	171 ± 9	137 ± 7	+ 6 ± 10	+ 34 ± 11	+ 40 ± 9	169 (± 33)	177 ± 4	8 (± 34)
30	102 ± 6	130 ± 9	125 ± 6	— 28 ± 11	+ 5 ± 11	— 23 ± 9	96 (± 35)	135 ± 4	— 39 (± 35)
31	55 ± 4	103 ± 9	103 ± 6	— 48 ± 10	0 ± 11	— 48 ± 7	24 (± 31)	87 ± 4	- 63 (± 32)
32	37 ± 4	68 ± 7	79 ± 5	— 31 ± 8	— 10 ± 9	— 42 ± 6	9 (± 26)	55 ± 3	- 46 (± 26)
33	14	41	61	— 27	— 20	— 47	12	36	- 24
34	8	27	52	— 19	— 25	— 43	12	19	- 7
35	5	15	41	— 10	— 26	— 36	0	11	- 11
36	3	9	25	— 7	— 16	— 22	9	5	- 4
37	1	5	21	— 4	— 16	— 20	..	3	- 3
38	0	4	12	— 3	— 8	— 12	..	1	- 1
39	1	1	10	0	— 10	— 10	..	..	..
40	..	..	7	..	— 6	— 6	..	..	..
41	..	..	1	..	— 1	— 1	..	..	..
42	..	..	1	..	— 1	— 1	..	..	..
43	..	..	0	..	0	0	..	..	..
44	..	..	0	..	0	0	..	..	..
45	..	..	0	..	0	0	..	..	..
46	..	..	0	..	0	0	..	..	..
47	..	..	0	..	0	0	..	..	..
48	..	..	0	..	0	0	..	..	..
49	..	..	0	..	0	0	..	..	..
50	..	..	0	..	0	0	..	..	..
51	..	..	1	..	— 1	1	..	..	..
over 33	32 ± 6	102 ± 17	233 ± 24	— 70 ± 17	—131 ± 29	—201 ± 25	33 (± 48)	75 ± 6	42 (± 49)

[1] The st. d. of this frequency is calculated under the assumption that the st. d. of the frequency in a sample has been the same in 1905 as in 1919.

Table VIII. Frequency of Length per 1000 of Plaice over 27 cm and Difference between Frequencies for Different Years with their Standard Deviations. — June. — Area A_3.

Area	$A_{3,b}$ (depth 9—19 m.)						$A_{3,a}$ (depth 7—8 m)		
Year	1904—1906	1916	1919	1904—1906 & 1916	1916 & 1919	1904—1906 & 1919	1916	1919	1916 & 1919
Length cm	Frequency from 18 samples from aver. depth 17 m	Frequency[1] from 6 samples from aver. depth 17 m	Frequency from 107 samples from aver. depth 15 m	Diff. of Freq.	Diff. of Freq.	Diff. of Freq.	Frequency from 1 sample from depth 7 m	Frequency from 3 samples fr. aver. depth 8 m	Diff. of Freq.[2]
27	395 ± 44	205 (± 51)	238 ± 12	+190 (± 67)	— 34 (± 51)	+157 ± 45	489	344	+145
28	227 ± 18	196 (± 31)	191 ± 7	+ 31 (± 36)	+ 5 (± 32)	+ 36 ± 19	213	268	— 55
29	165 ± 13	168 (± 22)	154 ± 5	— 3 (± 26)	+ 14 (± 23)	+ 10 ± 14	85	142	— 57
30	87 ± 12	138 (± 18)	112 ± 4	— 50 (± 22)	+ 26 (± 18)	— 24 ± 13	106	97	+ 9
31	60 ± 10	88 (± 17)	76 ± 4	— 28 (± 20)	+ 12 (± 17)	— 16 ± 11	64	53	+ 11
32	31 ± 8	69 (± 16)	68 ± 4	— 38 (± 18)	0 (± 17)	— 37 ± 9	0	39	— 39
33	18	40	47	— 22	— 7	— 29	43	24	+ 19
34	8	39	38	— 31	+ 1	— 30	...	13	— 13
35	4	26	27	— 22	— 1	— 23	...	13	— 13
36	2	18	18	— 16	0	— 16	...	0	0
37	2	7	10	— 5	— 3	— 8	...	0	0
38	1	2	7	— 2	— 5	— 7	...	8	— 8
39	1	0	5	— 1	— 5	— 5	...	...	...
40	...	4	3	— 4	+ 2	— 2	...	...	...
41	...	...	2	...	— 2	— 2	...	...	...
42	...	...	1	...	— 1	— 1	...	...	...
over 33	35 ± 12	136 (± 61)	159 ± 14	—101 (± 62)	— 23 ± 62	—124 ± 18	43	58	— 15

[1] St. d. calculated by means of the samples from 1919.

[2] There is no basis for calculating directly the st. d. of this difference, but it is evident, from the number of samples, that the st. d. must be expected to be greater than twice the value of those of the corresponding column of Table VI.

For April our figures (see Table VI) do not decidedly show an increase in size from 1904—1906 to 1916, the frequencies of 27 and 28 cm have declined and those of the other groups increased, but the difference does only for 30 cm approach twice its st. d., and also for the total number over 33 cm the increase is uncertain.

Between 1916 and 1919 there is for $A_{3,b}$ a distinct deviation which especially appears in the frequencies of 27 cm where the difference is 3,5 times its st. d. The deviation is otherwise shown by an essential increase in the number of plaice in the groups 31, 32 and over 33 cm. What is said here about the difference between 1916 and 1919 also applies to the difference between 1904—06 and 1919.

From $A_{3,a}$ no samples are taken in 1904—1906 and only 4 in 1916, while we have 19 from 1919. The comparison between 1916 and 1919 therefore does not rest on a very firm basis, but the deviations found show a still greater increase in size than that proved for $A_{3,b}$.

The material for June (see Table VIII and Fig. 5) is unfortunately in 1916 rather scant. While it may be concluded probable that the size of plaice has increased from 1904—1906 to 1916, it is doubtful whether any essential deviation can be pointed out between 1916 and 1919. If however we compare 1904—1906 with 1919 we have no hesitation in asserting that the size of plaice has increased during this interval of time, and it is above all evident for the total frequency over 33 cm of length which has increased by 124 ± 18.

It is noticed in Tables VI—VIII that in all cases where the number of samples is not very small the average depth of the fishing-place has declined from 1904—1906 to 1916 and again from 1916 to 1919. It follows from section 3 that the increases in size pointed out would have stood out still more conspicuously if we had been able to compare samples arisen from the same average depths.

APRIL.

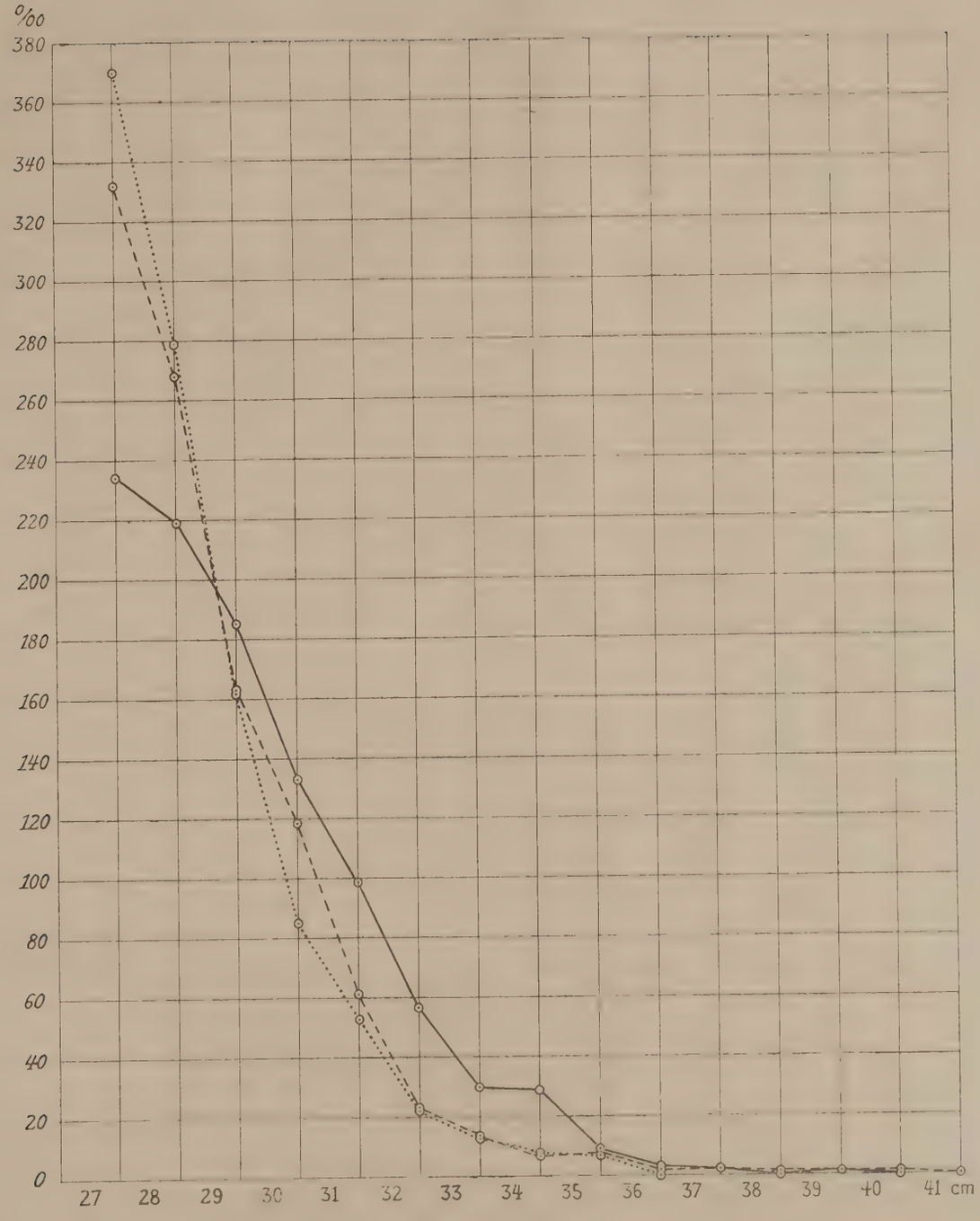

Fig. 3. Frequencies of Length per 1000 of Plaice over 27 cm in Area $A_{3,b}$.
..... 1904—1906. - - - - - - - - 1916. ———— 1919.

MAY.

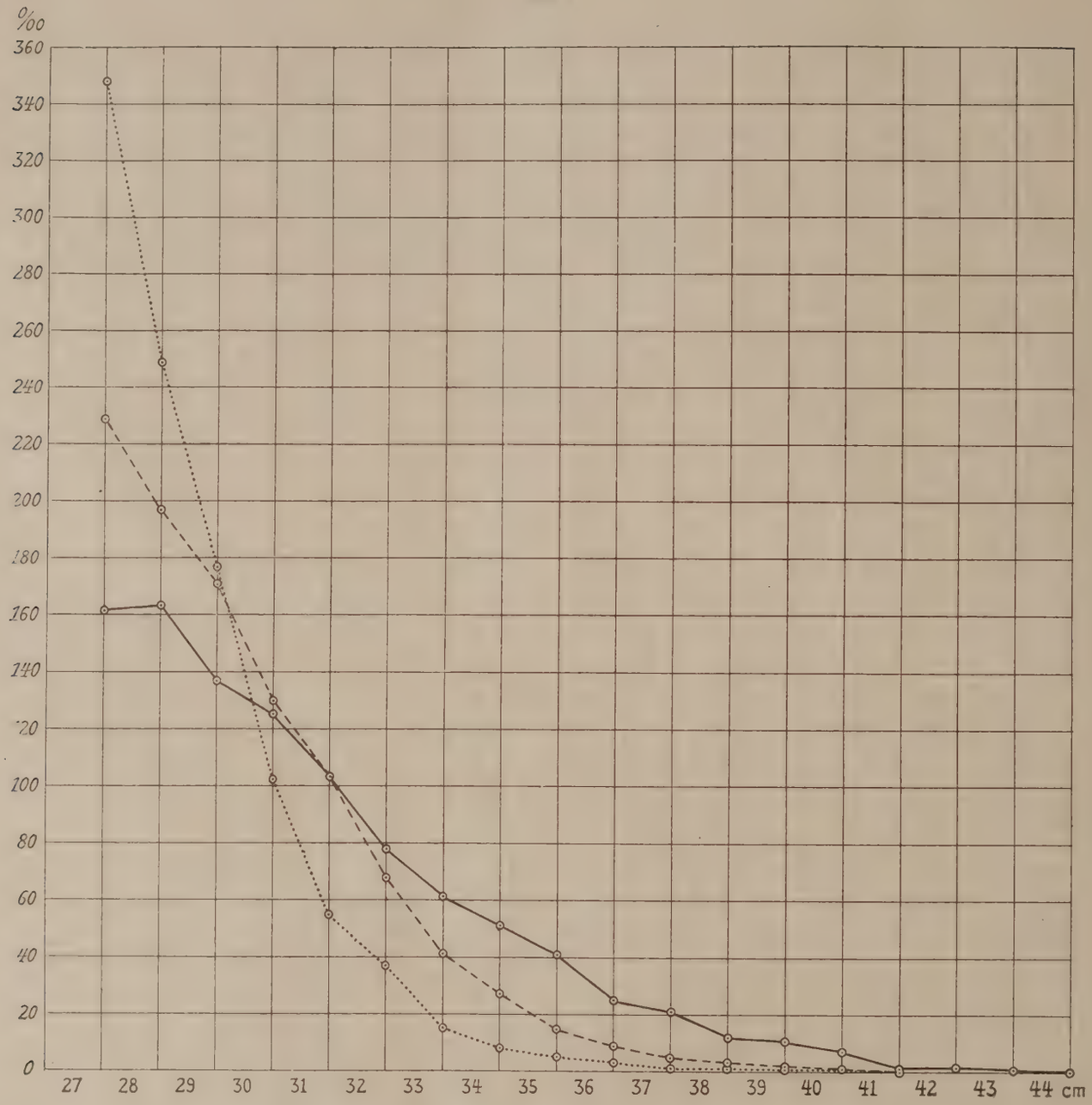

Fig. 4. Frequencies of Length per 1000 of Plaice over 27 cm in Area $A_{2,b}$.

..... 1904—1906. - - - - - - - - - 1916. ———— 1919.

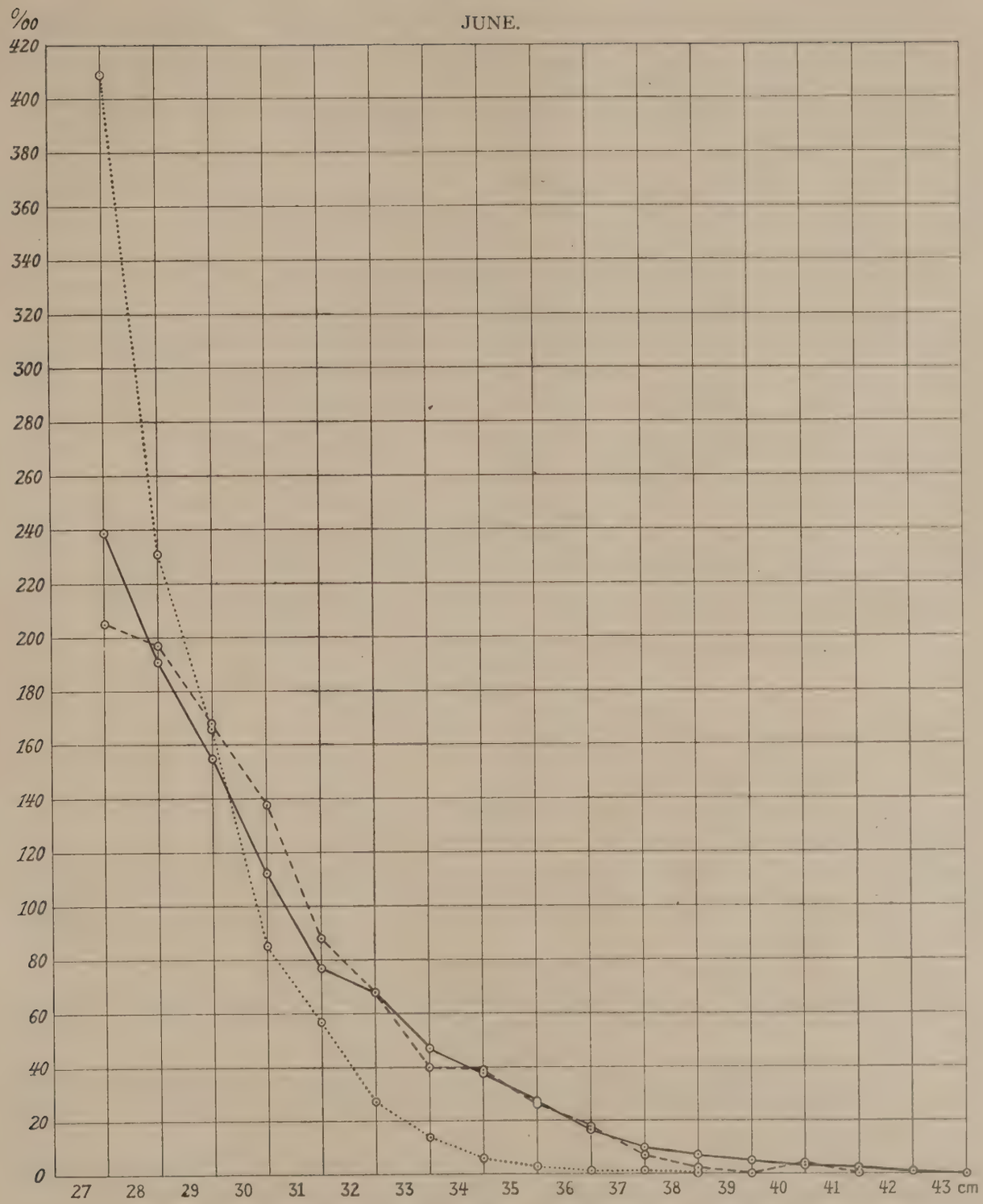

Fig. 5. Frequencies of Length per 1000 of Plaice over 27 cm in Area A_3, b.

..... 1904—1906. - - - - - - - - - 1916. ——— 1919.

Some of the results of Tables VI—VIII are summarized in Table IX.

Table IX. Frequencies of Plaice per 1000 of Plaice over 27 cm in $A_{3,b}$.
(Average depth in brackets.)

Length cm	27—30			30—33			over 33		
Month	Apr.	May	June	Apr.	May	June	Apr.	May	June
1904—06	812 (15)	773 (15)	787 (17)	160	194	179	28 ± 11	32 ± 6	35 ± 12
1916	763 (11)	597 (14)	569 (17)	202	301	295	36 ± 7	102 ± 17	136 ± 61
1919	638 (10)	461 (11)	584 (15)	289	307	256	74 ± 13	233 ± 24	159 ± 14

While in 1904—1906 and 1916 we notice a slight increase of plaice over 33 cm from April to May and again from May to June, which is however only for April to May 1916 great enough to be proved real by our material, we find in 1919 a decided increase from April to May and a decline of 74 ± 28 from May to June. This is clearly illustrated in Fig. 2 where it is noticed for each depth that the number of plaice over 33 cm is greater in May than in June. When we consider the difference between the average depths of the fishing-places in May and June for the various years we do not in their values find a cause that explains a drop in size in 1919, and it is perhaps not quite excluded that this may be due to a very intensive fishing during May which has especially selected the larger plaice. The fishing area for the Esbjerg fishermen was in the spring and summer of 1919, although increasing, much smaller than usually on account of the still remaining mineblocks.

5. Length of plaice from B_4.

From B_4 we have for June a small material of measurements consisting of 10 samples from 1904—1906, 6 from 1916, and 12 from 1919. When adding the samples from each period and calculating the distribution per 1000 of plaice over 27 cm for the size-groups used in Table IX we arrive at the results given in the following table:

Table X. Frequencies of Plaice per 1000 of Plaice over 27 cm for B_4 in June.
(Average depth in brackets.)

Length cm	27—30	30—33	over 33
1904—06	656 (23)	284	59
1916	602 (21)	292	106
1919	505 (22.5)	291	204

To get an idea of the accuracy of the figures in the last column of this table we shall make a rough judgement of their st. ds., taking the st. d. of the frequency over 33 cm for $A_{3,b}$ in June 1919 (see Table IX) as our starting point. This frequency was calculated from 107 samples, we may hence assume that the st. ds. of the frequencies over 33 cm in Table X are from 3 to 4 times the st. ds. of the named frequency, that is abt. 50. All we can conclude from Table X is therefore that it is probable that the number of large plaice in B_4 has increased from 1904—1906 to 1919.

III. Investigations concerning the weight and the number of plaice in area A_3.

1. Weight pro score.

Until 1919 we only have an estimate of the weight pro score of the samples measured, while from that year the samples have been weighed so that we are able to compare the direct results of weighing with such weights which are calculated from the length.

We have, starting from the distribution of frequencies given in Table IV, calculated the average weight pro score of the samples from A_3 using the formula

$$g = \frac{l^3}{100} k,$$

where g gives the weight of a plaice in gramme when l is the length of it measured in cm; k is put equal to 1. The results are given in Table XI.

Table XI. Weight pro score in kgs. of Catch from A_3 (calculated under the assumption that the coefficient of nourishment equals 1).

	April	May	June
1904—1906	4.280	4.348	4.459
1916	4.397	4.919	4.940
1919	4.911	5.179	5.029

From the weighings we find for April, May and June of 1919 the following weights pro score:

4.695, 4.794 and 4.860.

which divided by the calculated weights give the ratios 0.956, 0.926 and 0.966 for k.

We have, making use of Table XVI, undertaken the same calculations for $A_{3,b}$ and $A_{3,a}$ separately for May 1919 and have arrived at the following results:

	$A_{3,b}$	$A_{3,a}$
From weighings	5.442	4.368
— formula	5.775	4.809
k	0.942	0.908

Apart from 0.908 we estimate that the values found for k do not differ essentially, and conclude that we may consider the coefficient of nourishment tolerably constant as far as April—June 1919 concerns with exception of May 1919, when a lower coefficient has to be applied for $A_{3,a}$. The difference found between the values of k for the areas $A_{3,b}$ and $A_{3,a}$ in May is partly explained by the corresponding difference in the average length, as k normally increases with the length (A. C. Johansen l. c. 1910 p. 58)[1]. For the other periods there are only few samples from $A_{3,a}$, we therefore do not expect any anomalism of that kind. In the following where we need only to deal with relative values of weights we may therefore simply neglect k and use the values of Table XI, except the one mentioned, as they stand.

2. Catch per fishing-day.

From Table XI in connection with information about the weight of catch per fishing-day we might draw some conclusions concerning alterations in the absolute number of plaice of a given size in area A_3.

The catches per fishing-day do however vary so much during one and the same month that a great number of observations are required to give a reliable mean-value suitable for comparison with that for the same month of another year. We have only for May 1916 and 1919 sufficient material at hand. For May 1916 it consists of 185 catches from A_3 of which only 4 have arisen from $A_{3,a}$, while in May 1919 we have information of 111 catches from $A_{3,b}$ and 142 from $A_{3,a}$. We shall therefore consider separately the results from $A_{3,b}$ and $A_{3,a}$ in 1919. In Table XII the catches have been grouped after the number of fishing-days, for each group the mean-value of the catches and, when possible, its st. d. are given.

Regarding the average catch for 1 fishing-day it appears that it is very much the same for $A_{3,b}$ in 1916 and in 1919, while for $A_{3,a}$ it is probably somewhat smaller. The difference is about the size of its st. d., but considering the great frequency of journeys with 1 fishing-day as compared with those of 2 fishing-days for the area $A_{3,a}$, it would seem plausible that the fishermen in these coastal waters were contented with a smaller catch per journey to avoid being on the sea during night. At any rate we do not consider the smaller average value a sign that the plaice is less dense in $A_{3,a}$ than in $A_{3,b}$. The average catches for 2 fishing-days are somewhat greater in 1919

[1] On the whole the values of k found here are smaller than those arrived at in other measurements carried out with dead plaice. But if we judge that a dead fish is on an average $^1/_2$ cm shorter when measured than it was when alive, while the weight is nearly unaltered, we should have to diminish our weights, calculated by formula, by abt. 5% to make them comparable with measurements undertaken with dead fish. This would make our values for k 5% greater, i. e. about equal to 1.00, a result well compatible with those of earlier measurements.

Table XII. Weight of catches of Plaice from Danish Motor-Cutters per journey and per fishing-day.

Month	May 1916			May 1919					
Area	A_3, b			A_3, b			A_3, a		
Number of fishing-days of a journey	Number of journeys	Total catch	Average catch	Number of journeys	Total catch	Average catch	Number of journeys	Total catch	Average catch
		Kgs.	Kgs.		Kgs.	Kgs.		Kgs.	Kgs.
0.5	1	210	210	..	..	..	..	..	..
1	42	59277	1415 ± 150	69	97975	1420 ± 119	113	141400	1251 ± 91
1.5	3	6499	2166	2	4500	2250	..	..	..
2	110	179949	1636 ± 81	37	67010	1811 ± 162	28	58600	2093 ± 313
3	19	38378	2020	2	3000	1500	1	1000	1000
4	6	12850	2142	1	4000	4000	..	..	..
All journeys	181	297163	1642 ± 69	111	176485	1590 ± 96	142	201000	1415 ± 99
Catch per fish.-day			854 ± 49			1131 ± 81			1169 ± 90

than in 1916, but also in this case the difference is about the size of its st. d. when we look at A_3, $_b$, while it is probable that the average for A_3, $_a$ is really greater than for A_3, $_b$. Also when we compare the average of all catches, not considering the number of fishing days, we find that no difference can be pointed out for A_3, $_b$ between 1916 and 1919, but it is probable that the average catch from A_3, $_b$ in 1916 has been greater than that from A_3, $_a$ in 1919. Speaking only of A_3, $_b$ we may hence say, that the average catches per journey are on the whole constant, and that the difference between May 1916 and May 1919 alone appears in the distribution of frequencies of the number of fishing-days. But these are on the other hand essentially different, which appears when we look at the average catch per fishing-day. It is abt. 300 kgs. greater in 1919 than in 1916, which means an increase of 32 per cent.

We have in May 1916 no measured samples from A_3, $_a$ and among the material concerning the number of fishing-days only 4 catches out of 189 from A_3 have been taken from A_3, $_a$. It must therefore be supposed that the amount of marketable plaice in A_3, $_a$ has in May 1916 been very small compared with that in May 1919. In this month the average catch per fishing-day was practically the same for A_3, $_a$ as for A_3, $_b$, so that the density of marketable plaice must be expected to have been approximately the same in the two areas.

The general statistics of fishing for May 1919 are not yet available, but it is beyond doubt that the number of cutters fishing in May 1919 has been greater than in 1916, so that we may conclude, that when the catch per fishing-day from A_3, $_b$ in 1919 is 1.32 times that in 1916 the quantity of marketable plaice on the grounds will have increased to more than 1.32 times its weight in 1916. For the whole area A_3 the increase must be greater still.

3. Variation of total number of plaice of given sizes.

In the following it will be examined how such a change in the weight as that mentioned above will have affected the number of plaice. For this purpose we have from Table XI calculated the following table:

Table XIII. Total Number of Individuals in 100 kgs. of Plaice from A_3.

	April	May	June
1904—1906	467.3	460.0	448.5
1916	454.9	406.6	404.9
1919	407.2	386.2	397.7

By means of Table XIII and Table IV we have further calculated the number of individuals over 27 cm of length contained in 100 kgs. of plaice (Table XIV) and the number of individuals between 27,0 and 28,0 cm of length contained in 100 kgs. of plaice (Table XV).

Table XIV. Number of Individuals over 27 cm in 100 kgs. of Plaice from A_3.

	April	May	June
1904—1906	266	271	255
1916	269	286	284
1919	298	296	280

Table XV. Number of Individuals of 27—28 cm in 100 kgs. of Plaice from A_3.

	April	May	June
1904—1906	94	94	79
1916	88	63	67
1919	58	58	63

While the values given in these tables for May 1916 only concern $A_{3,\,b}$, the values for May 1919 are drawn from samples taken as well from $A_{3,\,a}$ as from $A_{3,\,b}$. For $A_{3,\,b}$ taken separately the number of individuals in 100 kgs. is 346 of which 43 are between 27 and 28 cm of length and 288 over 27 cm.

Under the supposition that the weight of marketable plaice in $A_{3,\,b}$ from May 1916 to 1919 has increased by 32 per cent, it follows from the values arrived at above that the total number of marketable plaice in $A_{3,\,b}$ has during the same interval of time, increased by 12 per cent, and the number of plaice over 27 cm by 33 per cent, which are distributed in the following way:

For number of plaice from 27 to 30 cm	0 %
- - - - - 30 - 33 -	34 %
- - - - over 33 -	201 %

The number of plaice of the length 27—28 cm has decreased by 10 per cent and those under 27 cm by 36 per cent.

Table XVI. Frequencies of Length per 1000 of Plaice from $A_{3,\,b}$ and $A_{3,\,a}$ in May.

Length cm	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	..	51
$A_{3,\,b}$: Frequency in 1916	..	..	130	166	155	135	120	93	74	50	30	21	11	8	4	2	1	..	..	..	..	..
$A_{3,\,b}$: - - 1919	9	25	49	87	124	129	112	104	87	68	53	45	36	23	19	11	9	6	2	1	..	1
$A_{3,\,a}$: - - -	10	35	86	144	168	163	129	100	66	42	27	15	8	4	2	..	..	..	..	..	..	..

It will be seen from Table XVI that owing to the smaller size-limit the samples from 1919 contain plaice under 25 cm which were not present in 1916. But for the sizes 25 and 26 cm we suppose that the sorting is less influenced by the size-limit than by the general size of the plaice in the catch.

The greater the number of large plaice the more inclined the fisherman feels to reject the smaller ones, so that a difference between the size of plaice in two catches will be enlarged by the sorting. We must therefore expect that the unsorted catches from May 1916 and May 1919 arising from $A_{3,\,b}$ do not for specimens below 27 cm differ so much as our measured samples do, so that, if there is at all a decline in the number of smaller plaice, it is at any rate smaller than the 36 % found above.

The same argumentation does not apply to plaice so large as 27—28 cm. But we have above reckoned with the minimum increase of weight, and all considered we venture to maintain, that the number of plaice of the length 27—28 cm was in May 1919 at least as great as in May 1916 for area $A_{3,\,b}$ and for the whole area A_3 in all probability much greater.

Unfortunately we have no information from other months about the variation of the quantity of plaice on the grounds. But we consider the supposition that the number of plaice of the length 27—28 cm has been constant plausible as an expression for the minimum of the increase which has taken place. We have therefore drawn diagrams for $A_{3,\,b}$ (Fig. 6) showing the number of plaice for each cm over 27 cm in proportion to the number between 27 and 28 cm. The curves are really the same as those in Figs. 3, 4 and 5, only the relative dimensions have changed.

If the assumption be valid, that the number of plaice of the length 27—28 has been constant, the curves give apart from the possible selection of the nets a picture of the stock of plaice on the grounds as regards number and length.

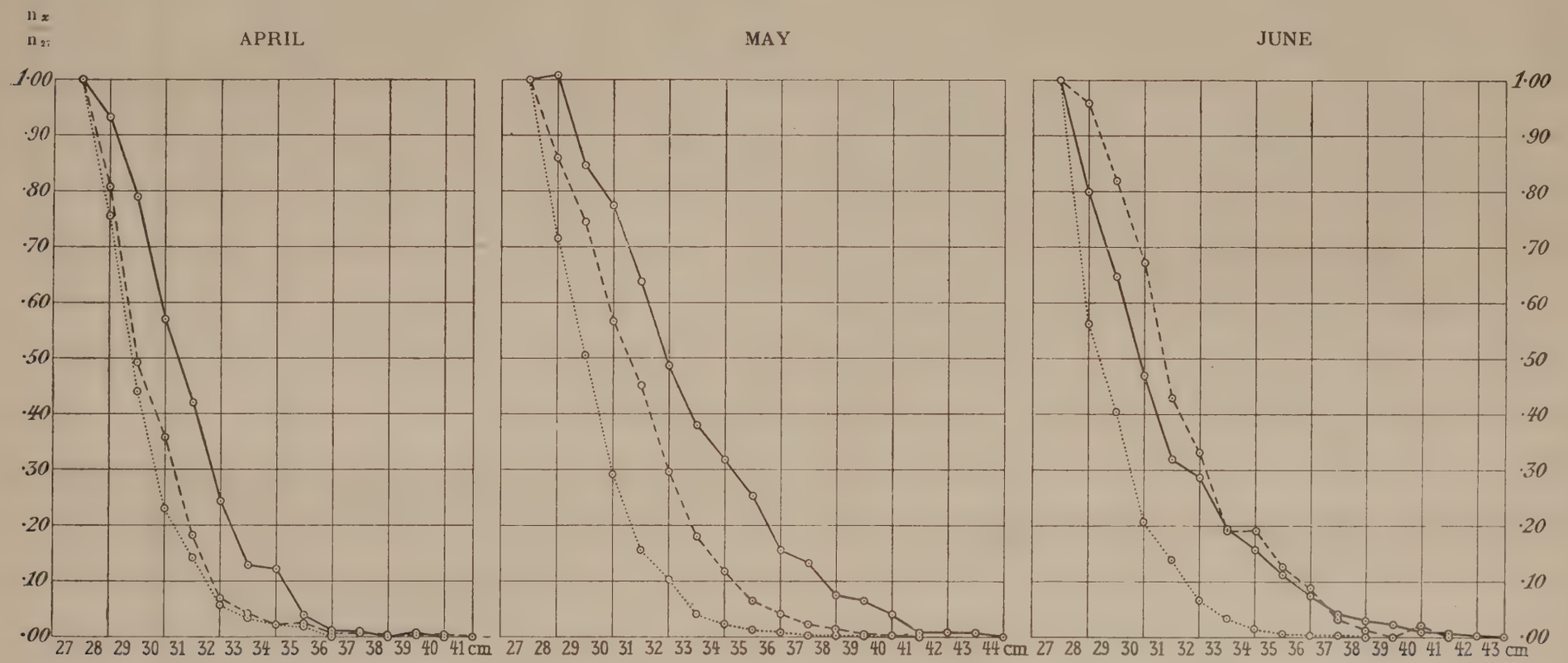

Fig. 6. Number of plaice (n_x) for each cm of length over 27 cm in proportion to number of plaice at 27 cm (n_{27}).

IV. Growth of plaice in area A_3 in later years as compared with growth about 1904—1907.

When it was noticed in the spring of 1919 that the length of plaice in A_3 showed so unusual values it was considered of interest to undertake some determinations of age. This was carried out for a sample of 245 plaice caught, on May 22., W of Fanø at the depth of 2 m and for a sample of 81 plaice caught, on June 19, 14 miles NNW of Hornum at the depth of 18 m. The result of the otolith examination are given in Tables XVII and XVIII*.

Table XVII. Size and Age of Plaice caught W of Fanø (Area A_3) at the depth of 2 m on May 22. 1919. — All specimens immature.

Sex	♂							♀								♂+♀							
Age-group	III	IV	V	VI	VII	?	Total	III	IV	V	VI	VII	VIII	?	Total	III	IV	V	VI	VII	VIII	?	Total
Length in cm																							
23	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1
24	1	1	..	..	..	..	2	3	2	..	..	..	..	..	5	4	3	..	..	..	..	..	7
25	1	6	3	3	..	2	15	2	10	10	3	..	..	..	25	3	16	13	6	..	..	2	40
26	..	5	6	1	..	2	14	..	11	12	2	..	..	..	25	..	16	18	3	..	..	2	39
27	1	7	9	3	..	..	20	1	11	12	2	1	..	..	27	2	18	21	5	1	..	..	47
28	..	7	10	7	1	..	25	..	13	12	6	2	1	..	34	..	20	22	13	3	1	..	59
29	..	1	5	2	1	..	9	..	5	5	2	2	..	3	17	..	6	10	4	3	..	3	26
30	..	..	1	2	1	..	4	..	2	4	2	1	..	2	11	..	2	5	4	2	..	2	15
31	..	..	1	1	..	..	2	..	..	1	2	..	..	..	3	..	..	2	3	..	..	..	5
32	..	..	..	..	..	1	1	..	..	..	2	1	..	..	3	..	..	..	2	1	..	1	4
33	..	..	..	..	..	..	..	..	..	1	1	..	..	..	2	..	..	1	1	..	..	..	2
Total	4	27	35	19	3	5	93	6	54	57	22	7	1	5	152	10	81	92	41	10	1	10	245
Aver. length	24.8	26.6	27.4	27.7	29.0	..	27.15	24.8	26.9	27.2	28.5	29.0	28.0	..	27.33	24.8	26.8	27.3	28.1	29.0	28.0	..	27.26

Table XVIII. Size and Age of Plaice caugth 14 miles N N W of Hornum (Area A_3) at the depth of 18 m on June 19. 1919.
All specimens except seven apparently immature (see foot of the table).

Sex	♂							♀							♂+♀							
Age-group	IV	V	VI	VII	VIII	?	Total	IV	V	VI	VII	VIII	IX	Total	IV	V	VI	VII	VIII	IX	?	Total
26	1	2	..	..	..	1	4	1	2	..	..	..	..	3	2	4	..	..	..	..	1	7
27	1	3	1	..	..	1	6	..	1	..	..	..	..	1	1	4	1	..	..	..	1	7
28	1	2	..	1	..	..	4	1	3	..	1	..	..	5	2	5	..	2	..	..	..	9
29	..	4	3	1	..	..	8	..	..	1	..	..	..	1	..	4	4	1	..	..	..	9
30	1	1	3	..	..	..	5	..	..	1	1	..	..	2	1	1	4	1	..	..	..	7
31	1	3[1]	2	3	1	..	10[1]	..	..	2	1	..	..	3	1	3	4	4	1	..	..	13
32	..	2	1	2	..	..	5	..	..	..	..	..	..	..	..	2	1	2	..	..	..	5
33	..	1	2	2	..	..	5	..	..	3	1	..	..	4	..	1	5	3	..	..	..	9
34	..	..	1	2	..	..	3	..	..	..	..	..	..	..	..	..	1	2	..	..	..	3
35	..	..	..	..	..	..	..	1	..	..	1	..	..	2	1	..	..	1	..	..	..	2
36	..	..	..	..	..	..	..	..	..	1	1	1	..	3	..	..	1	1	1	..	..	3
37	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	1	..	..	..	..	1
39	..	..	..	1[2]	..	..	1[2]	..	..	..	3[2]	..	1[3]	4[2]	..	..	..	4	..	1	..	5
45	..	..	..	..	..	..	..	..	..	..	..	..	1[3]	1[3]	..	..	..	..	..	1	..	1
Total	5	18	13	12	1	2	51	3	6	9	9	1	2	30	8	24	22	21	2	2	2	81
Aver. length	28.4	29.2	30.6	32.3	31.0	..	30.12	29.7	27.2	32.6	34.4	36.0	42.0	32.50	28.9	28.7	31.4	33.2	33.5	42.0	..	31.00

[1] One of these mature.
[2] Mature.
[3] Will become mature at the next period of spawning.

* Owing to the slow growth the age determination for the samples from 1915 and 1919 was more difficult than that for the earlier years and is probably therefore followed by more mistakes.

We have for comparison three samples from A_3 in which the age is determined by otolith examination, viz. a sample taken near Sild in March 1904[1], a second composed of several samples taken about the beginning of May 1907[2], and a third sample from W of Sild from April 1915[3]. The samples from 1904 and 1907 are taken by otter-trawl, and the samples from 1915 and 1919 by Snurrevaad. The last named samples are moreover sorted before landing, the smallest specimens being discarded.

Owing to the different way in which the fish has been captured and sorted the material does not allow a comparison between the average length of the various age-groups in the different periods. We may however compare the plaice over 27 cm of length, assuming that they are not affected by selection or sorting. In Table XIX are given for each age-group the percentage of plaice over 27 cm belonging to it and the average length of the plaice. The length are referred to April 1. by means of corrections calculated by taking mean-values of the growth from the period 1903—1912[4]; the corrections are given in the bottom line of the table.

Table XIX. Showing for Plaice over 27 cm from A_3 for each Age-Group the Average Length and the Frequency per cent in brackets.

Date	19.III.1904	From 27.IV to 7.V.1907	25.IV.1915	22.V.1919	19.VI.1919
Fishing-place	Near Sild	Various stations	W of Sild	W of Fanø	14 miles NNW of Hornum
Depth m	?	average abt.14	16	2	18
Age group					
II	27.05 (2)	..	..	..	..
III	28.12 (98)	27.63 (19)	26.80 (1)	26.35 (1)	..
IV	..	29.02 (72)	28.47 (2)	27.18 (30)	28.48 (8)
V	..	31.75 (5)	28.42 (32)	27.51 (40)	27.85 (27)
VI	..	30.42 (3)	29.79 (59)	28.26 (21)	30.06 (30)
VII	..	..	31.43 (6)	28.35 (7)	31.84 (29)
VIII	..	..	..	27.35 (1)	32.15 (3)
IX	..	..	..	..	40.65 (3)
XIV	..	59.00 (1)	..	..	..
Correction applied for referring length to April 1	+ .05	— .25	— .20	— .65	— 1.35

Looking first at the two samples from 1919 we notice that the average length for the same age-groups are in all cases greater in the sample taken from the depth of 18 m than in that from the depth of 2 m. This result agrees very well with the experiences made by Redeke[5] and several other naturalists that the largest specimens of each of the age-groups are on an average found in deeper water than the smaller ones. There is further the difference between the two samples that the plaice from 18 m are on the whole one year older than those from the shoaler water, the predominating age-groups being in the first case IV, V and VI and in the other case V, VI and VII. In the sample from 1915 the V and VI groups are prominent, while the VII group is less numerous than in the sample from 18 m in 1919. We do not consider the difference between the average lengths in the two samples significant. Turning to the two samples from 1904 and 1907 we find it conspicuous that the age groups III and IV form the main part of plaice over 27 cm. In 1904 the average length of the III group lies between that of the V group of the two samples

[1] H. N. Maier: Beiträge zur Altersbestimmung der Fische I 1906, p. 102.

[2] A. C. Johansen: Meddelelser fra Kommissionen for Havundersøgelser, Serie: Fiskeri, Bd. III, Nr. 8, 1910, Tab. 60—65.

[3] A. C. Johansen: Meddelelser fra Kommissionen for Havundersøgelser, Serie: Fiskeri, Bd. IV, Nr. 9, 1915, p. 27.

[4] A. C. Johansen: Contributions to the Biology of the Plaice VII, Fig. 22, 23 & 24.

[5] H. C. Redeke: The Distribution of the Plaice on the Dutch Coast. Rapports et Proc. Verb. cons. perm. internat. Vol. III 1905.

from 1915 and 1919 from about the same depth, and in 1907 the average length of the IV group lies between that of the V and VI groups in the two named samples. It is evident, from what we have here pointed out, that the older age-groups have in the course of time got to form a greater part of the plaice over 27 cm, and it is clear that the average length of a given age-group in these samples has declined between 1904—1907 and 1915—1919, in other words, the rate of growth has been much slower during the years about 1915—1919 than about 1904—1907. If these few samples give an essentially true picture of the conditions, it thus follows that the general increase of the length of plaice in A_3, proved in a previous chapter, is due to an increased frequency of older plaice which outweigh a decrease of growth.

A comparison of the average age of plaice of given length, represented in Table XX[1] and Fig. 7, show a corresponding rise of the age from 1904—1907 to 1915—1919.

Table XX. Showing Average Age of Plaice from A_3 for each cm of Length
(Number of plaice in brackets).

Date	19.III.1904	From 27.IV to 7.V.1907	25.IV.1915	22.V.1919	19.VI.1919
Fishing-place	Near Sild	Various stations	W of Sild	W of Fanø	14 miles NNW of Hornum
Depth m	?	Average abt. 14	16	2	18
Length cm					
23	2.25 ± .05 (77)	3.03 ± .04 (72)	5.00 (2)	3.00 (1)	..
24	2.50 ± .08 (40)	3.17 ± .06 (53)	4.00 (7)	3.43 (7)	..
25	2.69 ± .09 (35)	3.34 ± .08 (35)	4.96 ± .19 (23)	4.58 ± .14 (38)	..
26	2.87 ± .08 (31)	3.32 ± .09 (31)	5.56 ± .12 (36)	4.65 ± .10 (37)	4.67 (6)
27	2.95 ± .05 (22)	3.72 ± .11 (18)	5.30 ± .15 (23)	4.68 ± .12 (47)	5.00 (6)
28	3.00 (18)	3.64 ± .12 (22)	5.50 ± .13 (24)	5.03 ± .13 (59)	5.22 (9)
29	3.00 (10)	3.93 (15)	5,54 ± .10 (28)	5.17 ± .20 (23)	5.67 (9)
30	3.00 (3)	4.00 (11)	5.76 (17)	5.46 (13)	5.71 (7)
31	3.00 (3)	4.25 (8)	6.13 (16)	5.60 (5)	6.08 (13)
32	..	4.33 (9)	5.82 (11)	6.33 (3)	6.00 (5)
33	..	4.50 (2)	6.00 (5)	5.50 (2)	6.22 (9)
34	..	4.00 (1)	6.50 (4)	..	6.67 (3)
35	..	5.00 (1)	5.67 (3)	..	5.50 (2)
36	..	..	..	..	7.00 (3)
37	..	..	..	..	6.00 (1)
38	..	..	6.00 (1)	..	..
39	..	..	..	..	..
40	..	..	..	..	7.40 (5)
45	..	..	..	..	9.00 (1)
59	..	14.0 (1)	..	..	..
Correction to apply for referring length to Apr. 1	+ .05	— .25	— .20	— .65	— 1.35

It is obvious that a declining growth as well as an increasing frequency of old plaice, resulting from other reasons[2] than slow growth, must appear in that way, and it is not possible from Table XX alone to distinguish the effect of the two causes.

[1] For each plaice the index of the age-group has been put down, and it is the average of these ages and the st. d. of the average which are given. Thus in this table the different season in which the samples have been caught are not taken into account.

[2] It is probable that such reasons have been present. We must suppose that the death-rate owing to the declining fishery has on the whole decreased and this must cause a greater relative frequency of older plaice. If for instance we imagine two populations identical to begin with, both living under equal conditions of nourishment, but subjected for some years to different conditions of fishing, it is clear that the population which has been most perse-

It appears on the whole from the otolith examinations that the rate of growth has been very slow for most of the specimens examined for a series of years preceding respectively 1915 and 1919. This slower rate of growth in the recent period as compared with that in the years preceding 1904 & 1907 must be a consequence of poorer conditions of nourishment, and when we see the relative abundance of older plaice in later years (see Table XIX) as compared with the earlier period there can hardly be any doubt, that the poorer conditions of nourishment is owing to a much denser plaice population in the northern parts of A_3 in later years than in the years preceding 1904 and 1907[1].

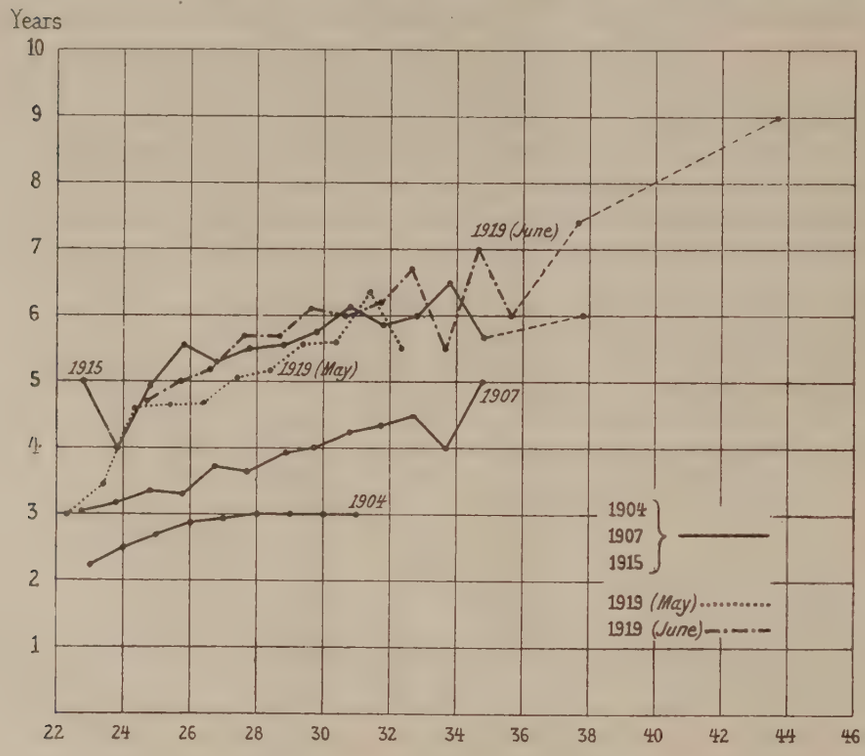

Fig. 7. Average age of Plaice for each cm of length from Area A_3 (Length referred to April 1.)

There are obvious reasons for connecting this fact partly with the declining English trawl-fishery in this area in the period after 1910 (see Table I) and partly with the general decline of the fishing as a consequence of the great war. It is of course also a possibility that in the years preceding 1915 and 1919 the abundance of the year brood has generally been greater in the northern part of A_3 than in the years preceding 1904 and 1907.

V. Concluding remarks.

For a considerable number of years before the outbreak of the great war investigations were undertaken on behalf of different countries with regard to the question, whether the stock of plaice in the North Sea and adjacent waters had changed owing to the enormous development of the sea fishery, which had taken place since the middle of the last century. The opinions about this question differed for a long time, but after the international co-operative work in the years 1903—1912 had provided a new series of facts, plainly indicating a change of the stock, almost all naturalists agreed in admitting such a change and in connecting it with the great development of the fishery; the change displayed itself especially in the fact that the number of large plaice decreased continuously in the catches, while the percentage of the small plaice strongly increased[2].

cuted especially will be deprived of the oldest individuals of every length, as they have during the longest period of time been exposed to capture. The result will be that the average age for plaice of a given length in the named population will appear smaller than in the other one.

[1] There is also a possibility that the difference in growth to a certain degree may be due to a difference in the amount of food produced in different years.

[2] At a meeting in London in June of 1913 the "Plaice Committee" of the International Council for the Study of the Sea agreed upon the following declaration:

In connection with the experiences made in the time before the war, it seemed desirable to investigate, whether the stock of plaice in the North would again change in a period in which the fishing was carried on with far less intensity than usually. Such a period occurred during the war, and we have here been able to prove that the number of large plaice has again highly increased while the percentage of small plaice in the catches has decreased in the investigated areas, (specially the northern part of A_3). Our age investigations tend to show that this general increase of size is due to an increased frequency of older plaice, while the growth of the plaice has been much slower. The results of the investigation thus suggest that we were justified when before the war we connected the said change in the stock of plaice in the North Sea with the increase of the intensity of fishing, and they show moreover with great certainty, that even a decrease, of relatively short duration, in the intensity of the fishing in the North Sea can be distinctly traced in an increasing number of larger fish.

The state of protection, in which the plaice has been in the North Sea owing to the war, has brought about a sort of gigantic experiment. There is no doubt that the stock of plaice, owing to this protection, has increased considerably, so that it will have for some time the possibility of yielding more than it has been able to for several years preceding the war. Whether this protection, without deliberate planning as it has been, will prove to have been an advantage, regarded from a fishery-economical point of view, is another question. During the five years of war 1914—1918 the total yield of the plaice fishery in the North Sea has been abt. 90—100 million kgs less than during the last five years preceding the war. It will be interesting to learn, if this great decline of the yield will be fully counterbalanced in weight or in value by a future surplus, when the fishing in the North Sea is again carried on with an intensity similar to that of the years preceding the war. We do not venture to bring forward any prophecy on this subject.

"The Plaice Committee having considered the Summary of Professor HEINCKE's General Report and all other available evidence upon the plaice and plaice fisheries of the North Sea are of opinion that

1. There has been for many years a decrease in the larger sizes of plaice in the North Sea.
2. The number of small plaice show great natural variations from year to year which express themselves in the landings of plaice.
3. The number of plaice of the smaller sizes in the landings has increased" . . .

Table XXI. Length of Plaice landed from 1916 and

Area	A 3													
Date of capture	27.IV.16	27.IV.16	27.IV.16	27.IV.16	27.IV.16	27.IV.16	27.IV.16	27.IV.16	27.IV.16	27.IV.16	27.IV.16	27.IV.16	27.IV.16	27.IV.16
Fishing-place	55°18′N 8°19′E	55°18′N 8°18′E	55°30′N 7°56′E	55°11′N 8°14′E	55°16′N 8°19′E	55°18′N 8°20′E	55°11′N 8°16′E	55°18′N 8°18′E	55°29′N 7°56′E	55°18′N 8°18′E	55°30′N 7°56′E	55°15′N 8°17′E	55°30′N 7°57′E	55°18′N 8°20′E
Depth in m.	9	12	11	11	9	8	11	11	9	11	11	11	15	8
Weight of catch in kg	1500	1000	5000	2000	2500	1500	1000	1000	600	1000	1500	800	1000	500
Weight pro score in kg	4	4	4	4.5	4.5	4.5	4.5	4	3.5	4.25	4	3.25	4	4
Length cm														
24	..	8	..	..	..	..	..	..	..	..	..	..	..	..
25	28	28	21	22	28	28	28	21	28	22	25	28	28	24
26	19	18	25	27	25	28	26	27	28	19	24	26	25	22
27	22	13	20	15	16	16	21	19	26	20	18	18	17	19
28	14	17	11	17	17	13	10	17	14	14	12	18	15	23
29	8	6	15	10	8	7	10	8	3	11	11	7	7	7
30	9	3	5	3	5	3	4	4	1	6	6	4	6	3
31	..	5	3	1	3	2	1	6	..	4	2	..	2	2
32	..	1	..	1	2	4	..	2	..	2	1	..	..	..
33	..	1	..	1	1	..	..	..	..	1	1	..	..	..
34	..	..	..	..	..	..	..	..	..	..	..	..	..	..
35	..	..	1	..	..	..	..	..	..	1	..	..	..	..
36	..	..	..	..	..	..	..	..	..	..	..	..	..	..
37	..	..	..	..	..	..	..	..	..	..	..	..	..	..
38	..	..	..	..	..	..	..	..	..	..	..	..	..	..
39	..	..	..	..	..	..	..	..	..	..	..	..	..	..
40	..	..	1	..	..	..	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total number	100	100	102	97	105	101	100	104	100	100	100	101	100	100
Average length cm.	26.82	26.71	27.22	26.90	26.95	26.80	26.64	27.10	26.39	27.31	26.97	26.62	26.74	26.84

Area	A 3													
Date of capture	29.IV.16	29.IV.16	29.IV.16	Apr.1916	1. V. 16	1. V. 16	1. V. 16	1. V. 16	1. V. 16	8. V. 16	8. V. 16	8. V. 16	8. V. 16	9. V. 16
Fishing-place	Vyl Light-ship	55°30′N 7°56′E	55°27′N 7°56′E		8 miles W of Son-derho	55°00′N 8°08′E	55°28′N 8°04′E	55°28′N 8°07′E	55°28′N 8°04′E	55°14′N 8°13′E	55°30′N 7°56′E	55°15′N 8°09′E	54°59′N 8°16′E	55°17′N 8°07′E
Depth in m.	—	13	13		9	15	15	13	15	13	11	15	11	15
Weight of catch in kg	800	3000	1000		1000	1000	2000	2000	1000	2500	1500	2000	1500	1000
Weight pro score in kg	4	4.75	5		3.5	4	4	3.5	4.5	3.5	4	6	3.5	6
Length cm				Total										
24	..	..	..	8	..	..	..	..	..	..	..	..	..	..
25	9	3	1	652	19	19	5	26	6	25	20	1	20	..
26	15	12	5	730	27	22	13	27	12	24	14	6	27	2
27	22	24	24	658	16	27	27	27	15	21	15	11	26	6
28	16	16	13	533	13	19	27	23	14	21	12	8	14	14
29	13	27	13	322	11	16	18	17	9	8	14	13	8	13
30	11	21	10	232	8	16	16	8	10	11	10	17	5	6
31	4	6	9	125	3	6	7	3	12	7	6	17	7	15
32	1	8	4	56	1	5	7	2	5	3	3	12	3	10
33	1	7	2	29	2	..	2	1	3	1	3	8	3	10
34	3	3	1	17	..	1	3	..	1	1	1	5	..	8
35	..	3	3	18	..	..	1	..	1	1	..	2	..	3
36	..	..	..	3	..	..	..	..	..	..	..	4	..	4
37	..	1	1	5	..	..	2	..	..	..	..	1	..	..
38	..	..	..	1	..	..	..	..	..	..	..	2	..	..
39	..	..	..	2	..	..	..	..	..	..	..	..	..	..
40	..	..	..	3	..	..	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total number	95	131	86	3394	100	131	128	134	88	123	98	107	113	91
Average length cm	27.95	29.11	28.99	27.35	27.23	27.73	28.66	27.22	28.64	27.49	27.82	30.48	27.35	30.76

Danish Cutters in Esbjerg

1919

A 3															Area
27.IV.16	28.IV.16	28.IV.16	28.IV.16	28.IV.16	28.IV.16	28.IV.16	28.IV.16	28.IV.16	28.IV.16	28.IV.16	28.IV.16	28.IV.16	29.IV.16	29.IV.16	Date
55°16′N 8°16′E	55°14′N 8°20′E	55°12′N 8°15′E	55°14′N 8°20′E	55°30′N 7°56′E	55°18′N 8°12′E	55°30′N 7°56′E	55°16′N 8°20′E	55°30′N 7°56′E	55°16′N 8°18′E	55°14′N 8°17′E	55°15′N 8°20′E	54°57′N 8°15′E	55°14′N 8°13′E	55°29′N 8°08′E	Fishing-place
13	9	13	9	13	15	13	8	11	11	9	8	9	13	9	Depth
800	1000	2500	1500	2000	1500	3000	2000	1000	1500	1000	1500	3000	2000	1000	Weight of c.
3.5	3.5	3.5	4.5	4.25	3.5	4	3	3.5	4	4	4		4	4.5	Weight pr. sc.
															Length cm
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24
26	21	25	11	15	21	18	28	15	22	5	26	15	25	7	25
26	23	27	23	16	27	24	26	23	28	23	28	25	20	20	26
18	17	26	27	19	20	19	25	17	27	26	26	23	22	16	27
12	15	20	20	17	20	23	13	16	21	23	20	19	13	24	28
7	11	12	9	12	9	12	7	9	13	18	5	7	9	11	29
12	8	3	8	10	10	13	2	10	7	13	4	5	14	9	30
5	3	2	5	7	6	11	4	6	5	5	3	7	1	5	31
1	1	2	2	5	..	2	2	2	2	3	3	..	1	4	32
1	..	..	..	1	2	..	..	2	1	5	..	..	..	2	33
1	2	1	..	3	..	..	1	1	..	1	..	..	..	..	34
..	..	..	1	4	..	2	..	..	..	1	..	..	..	2	35
..	..	..	1	..	..	..	..	1	..	..	..	..	..	1	36
..	..	..	..	2	..	..	..	1	..	..	..	..	..	..	37
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	38
..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	39
..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	40
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	41
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	42
109	101	118	109	111	115	125	108	103	126	123	115	101	105	103	Total number
27.20	27.27	27.01	27.81	28.38	27.30	27.87	26.85	27.81	27.25	28.18	26.90	27.21	27.11	28.36	Average

A 3															Area
9. V. 16	9. V. 16	9. V. 16	9. V. 16	9. V. 16	10. V. 16	10. V. 16	10 .V. 16	10.V.16	10.V.16	10.V.16	11.V.16	11.V.16	24.V.16	24.V.16	Date
55°15′N 8°10′E	55°15′N 8°10′E	55°14′N 8°11′E	55°16′N 8°12′E	54°59′N 8°16′E	55°31′N 7°55′E	Slugen	55°16′N 8°10′E	55°19′N 8°04′E	55°17′N 8°08′E	55°31′N 7°56′E	55°31′N 7°55′E	55°31′N 7°55′E	55°30′N 8°03′E	55°28′N 8°01′E	Fishing-place
15	15	13	15	11	19	15	13	15	13	17	19	17	19	13	Depth
1000		1500	1500	1000	3000	3000	3000	1000	300	2500	2500	1000	1000	1000	Weight of c.
4	4.5	4	6	3.5	5	4	4	6.5	6	4	4	3.5	3.5	5	Weight pr. sc.
															Length cm
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24
19	8	27	..	17	11	18	18	..	1	13	27	24	26	11	25
23	25	26	5	24	18	27	18	3	5	25	21	23	21	20	26
19	17	22	9	23	13	26	19	3	4	18	23	15	23	12	27
9	16	16	4	20	13	14	22	8	8	17	9	12	19	13	28
9	15	6	11	10	19	20	20	13	6	15	13	6	13	13	29
12	7	3	19	12	10	6	7	9	11	2	8	2	9	6	30
2	6	2	20	5	4	7	3	6	15	6	3	6	7	10	31
2	8	3	13	1	3	1	1	7	10	4	3	4	2	16	32
1	4	..	8	..	2	..	1	9	4	2	..	..	1	6	33
..	6	..	5	..	3	..	3	6	3	..	1	..	1	3	34
1	..	..	7	..	1	1	..	2	3	..	..	..	..	3	35
..	2	..	1	..	..	1	..	2	3	..	..	..	1	3	36
..	..	..	1	..	2	..	..	2	1	..	..	..	..	1	37
..	..	..	..	..	..	..	..	3	..	..	..	..	..	1	38
..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	39
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	40
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	41
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	42
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	43
97	114	105	103	112	99	121	112	74	74	102	108	92	123	119	Total number
27.35	28.53	26.81	30.70	27.38	28.34	27.49	27.65	31.22	30.54	27.57	27.17	27.03	27.48	29.32	Average

Table XXI (continued)

Area	A 3													
Date of capture	24.V.16	24.V.16	24.V.16	24.V.16	24.V.16	25.V.16	25.V.16	May 1916	28.VI.16	28.VI.16	28.VI.16	28.VI.16	28.VI.16	28.VI.16
Fishing-place	55°26′N 8°08′E	55°28′N 8°01′E	55°15′N 8°06′E	55°28′N 8°07′E	55°24′N 8°12′E	55°28′N 8°04′E	55°25′N 8°12′E		55°23′N 8°08′E	55°21′N 7°53′E	55°26′N 7°50′E	55°13′ N 8°00′E	55°29′N 7°53′E	55°19′N 8°07′E
Depth in m	13	13	15	13	15	15	13		13	19	19	17	7	15
Weight of catch in kg	1500	1000	1000	1500	1000	1000	1000		1000	700	700	900	800	1000
Weight pro score in kg	4	4	5.5	5.5	5	3.5	4.5		5.5	5	4.5	5.5	3.75	5.5
Length cm								Total						
24	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25	11	15	5	..	11	16	14	433	13	9	22	8	27	4
26	17	14	9	4	15	23	14	554	25	9	20	5	24	8
27	13	12	8	8	13	8	16	515	26	8	14	10	23	14
28	13	12	11	8	19	10	12	450	21	11	12	12	10	10
29	13	13	9	12	17	5	14	399	16	8	5	8	4	16
30	12	12	19	13	17	5	3	311	11	4	8	12	5	8
31	9	13	11	9	6	5	8	246	4	6	4	7	3	5
32	6	7	9	6	2	2	5	166	2	3	3	7	..	7
33	1	4	3	10	5	3	4	101	2	3	..	4	2	3
34	3	1	4	4	5	..	1	69	2	1	2	7	..	1
35	1	..	3	1	4	2	1	38	2	3	..	2	..	2
36	..	1	2	1	1	..	..	26	..	..	..	3	..	2
37	..	..	2	1	..	..	..	13	..	..	..	2	..	1
38	..	..	..	1	..	..	..	7	..	..	..	..	..	..
39	..	..	..	..	..	..	..	2	..	..	..	..	..	..
40	..	..	..	1	..	..	..	1	1	..	..	..	..	1
41	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total number	99	104	95	79	115	79	92	3331	125	65	90	87	98	82
Average length cm	28.38	28.51	29.78	30.44	28.80	27.56	28.12	28.33	27.93	28.54	27.30	29.78	26.79	29.28

Area	A 3		B 4											
Date of capture	24.X.16	1916	1. V. 16	8. V. 16	8. V. 16	9. V. 16	11.V.16	May 1916	28.VI.16	28.VI.16	28.VI.16	29.VI.16	29.VI.16	30.VI.16
Fishing-place	Esperance Bay		55°19′N 7°43′E	NW of Slugen	Slugen	55°31′N 7°57′E	55°30′N 7°58′E		55°19′N 7°56′E	55°14′N 7°53′E	55°12′N 7°43′E	55°14′N 7°55′E	55°11′N 7°48′E	55°13′N 7°52′E
Depth in m			23	21	23	21	24		21	21	21	21	20	20
Weight of catch in kg	3000		2500	1000	8000	2500	2000		700	3000	500	1000	600	800
Weight pro score in kg	4		4.5	5.5	5	4	4		4	5.5	4.5	5	4	5.5
Length cm		Total						Total						
24	..	8	..	..	..	..	..	..	..	..	..	..	..	..
25	29	1465	17	3	4	22	27	73	20	11	17	11	15	14
26	29	1678	27	11	16	24	25	103	20	9	10	24	19	10
27	25	1458	21	12	20	23	27	103	16	19	9	23	7	11
28	19	1181	21	8	27	22	19	97	10	14	7	15	10	8
29	9	871	10	11	12	12	16	61	4	15	9	11	7	15
30	5	635	6	16	20	4	6	52	1	14	7	5	16	12
31	1	431	5	8	5	4	3	25	..	10	7	9	6	8
32	..	257	1	11	8	..	..	20	..	5	3	5	2	2
33	..	152	1	7	6	2	..	16	..	2	3	3	..	5
34	..	104	1	6	4	..	1	12	..	3	3	1	..	1
35	..	70	..	8	1	..	1	10	..	1	1	1	1	3
36	1	38	..	4	3	..	..	7	..	1	..	..	1	2
37	..	22	..	5	..	..	..	5	..	1	..	..	..	..
38	..	11	..	2	..	..	..	2	..	1	..	..	..	..
39	..	5	..	..	..	..	..	..	..	..	..	1	..	..
40	..	6	..	..	..	..	..	..	..	..	1	..	..	1
41	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44	..	..	1	..	..	..	..	1	..	..	..	..	..	..
45	..	..	1	..	..	..	..	1	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..	..	..	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total number	118	8392	112	112	126	113	125	588	71	106	77	109	74	92
Average length cm	26.81	27.74	27.63	30.61	28.95	27.16	27.14	28.29	26.45	28.80	28.36	28.03	27.59	28.85

A 3															Area
29.VI.16	June1916	7.VII.16	12.VII.16	26.VII.16	July1916	9.IX.16	9.IX.16	11.IX.16	26.IX.16	26.IX.16	26.IX.16	28.IX.16	28.IX.16	Sept 1916	Date
55°09′N 7°56′E		55°16′N 8°04′E	55°02′N 7°52′E	55°30′N 7°48′E		55°29′N 7°53′E	Slugen	Horns-Rev	55°22′N 8°01′E	55°23′N 7°56′E	Slugen	55°29′N 8°07′E	55°28′N 8°12′E		Fishing-place
19		17	18	10		7			18	16		8	7		Depth
800		1500	800	500		300	1500	1500	1000	1000	2000	1000	500		Weight of c.
5.5		5	4.5			4	4	4	4	4	4	4	4		Weight pr. sc.
	Total				Total									Total	Length cm
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24
6	89	12	15	28	55	27	19	26	28	29	29	23	26	207	25
10	101	15	25	28	68	20	25	24	28	29	25	25	20	196	26
10	105	12	20	19	51	14	16	14	12	11	10	9	18	104	27
11	87	17	21	8	46	5	10	7	..	1	2	11	10	46	28
16	73	13	17	6	36	..	5	..	1	3	1	5	17	32	29
13	61	11	3	4	18	2	3	..	1	..	..	..	2	8	30
8	37	8	7	4	19	..	..	1	..	..	2	..	..	3	31
5	27	4	2	..	6	1	..	..	1	..	..	..	..	2	32
4	18	2	1	..	3	..	..	1	..	..	..	..	..	1	33
3	16	1	..	..	1	..	..	1	..	..	..	..	..	1	34
1	10	3	..	..	3	1	..	..	..	..	..	..	..	1	35
3	8	..	..	..	..	..	..	..	..	..	..	..	..	..	36
..	3	..	..	..	..	1	..	..	..	..	..	..	..	1	37
1	1	1	..	..	1	..	..	..	..	1	..	..	..	1	38
..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	39
..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	40
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	41
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	42
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	43
91	638	99	111	97	307	71	79	74	71	74	69	73	93	604	Total number
29.29	28.35	28.44	27.48	26.63	27.52	26.44	26.72	26.30	25.96	26,07	25.97	26.32	26.76	26.34	Average

B 4												C 2		Area
June 1916	7.VII.16.	7.VII.16	7.VII.16	7.VII.16	10.VII.16	10.VII.16	10.VII.16	10.VII.16	26.VII.16	July 1916	1916	12.VII.16	12.VII.16	Date
	55°02′N 7°32′E	55°36′N 7°19′E	55°10′N 7°47′E	55°13′N 7°47′E	55°03′N 7°45′E	55°08′N 7°34′E	55°03′N 7°45′E	55°25′N 7°34′E	55°46′N 6°55′E			55°02′N 6°35′E	54°58′N 6°22′E	Fishing-place
	24	32	21	21	22	21	22	28	35			42	44	Depth
	1500	2500	1300	2000	900	800	800	300	1000			1500	4000	Weight of c.
	6	6	5	5.5	5.5	4.5	5	6	5			9	12.5	Weight pr. sc.
Total										Total	Total			Length cm
..	..	..	..	..	..	..	..	..	..	..	..	..	..	24
88	2	8	14	15	14	23	23	8	13	120	281	..	..	25
92	9	10	20	12	16	22	17	13	17	136	331	..	..	26
85	15	7	11	23	12	13	25	8	15	129	317	2	..	27
64	27	5	12	17	16	6	13	14	18	128	289	2	..	28
61	16	2	12	10	14	9	11	9	9	92	214	2	6	29
45	21	6	3	15	4	9	4	8	7	77	174	3	4	30
40	8	8	4	6	3	3	9	12	4	57	122	5	4	31
17	5	3	4	5	4	3	1	6	5	36	73	3	6	32
13	2	6	2	5	2	2	4	4	4	31	60	7	5	33
8	1	4	1	1	2	..	1	3	3	16	36	3	3	34
7	1	6	..	..	..	1	..	1	2	11	28	7	3	35
4	..	2	..	..	..	1	..	1	..	4	15	5	4	36
1	..	4	..	..	1	..	..	1	1	7	13	2	4	37
1	..	..	..	..	1	..	..	3	..	4	7	2	4	38
2	..	..	..	..	..	..	..	..	1	1	2	1	2	39
..	2	..	..	..	..	..	..	..	..	..	2	..	3	40
..	..	..	..	..	..	..	..	..	..	2	2	..	2	41
..	..	..	..	..	..	..	..	1	..	1	1	2	1	42
..	..	..	..	..	..	..	..	..	..	..	..	2	..	43
..	..	..	..	..	..	..	..	..	..	..	1	..	..	44
..	..	..	..	..	..	..	..	..	..	..	1	..	..	45
..	..	..	..	..	..	..	..	..	..	..	..	..	..	46
..	..	..	..	..	..	..	..	..	..	..	..	..	2	47
..	..	..	..	..	..	..	..	..	..	..	..	..	2	48
..	..	..	..	..	..	..	..	..	..	..	..	2	..	50
..	..	..	..	..	..	..	..	..	..	..	..	1	..	53
529	109	71	83	109	89	92	108	92	99	852	1969	51	55	Total number
28.10	28.79	30.07	27.63	28.16	28.02	27.42	27.52	29.45	28.36	28.37	28.27	34.88	35.24	Average

Table XXI (continued)

Area	C 2													
Date of capture	12.VII.16	26.VII.16	27.VII.16	28.VII.16	28.VII.16	29.VII.16	29.VII.16	29.VII.16	29.VII.16	July 1916	10.VIII.16	10.VIII.16	10.VIII.16	10.VIII.16
Fishing-place	54°58′N 6°22′E	54°48′N 6°40′E	54°56′N 6°15′E	55°26′N 5°55′E	55°12′N 6°20′E	55°39′N 6°17′E	55°34′N 6°02′E	55°10′N 6°08′E	55°09′N 6°03′E		55°25′N 5°38′E	55°25′N 6°12′E	55°25′N 5°48′E	55°25′N 5°27′E
Depth in m	44	40	40	50	48	42	50	43	45		49	49	50	40
Weight of catch in kg	2500	300	400	500	500	400	500	1000	600		600	400	1500	2000
Weight pro score in kg	7.5	5	7.5	9	15	7	6	7.5	7.5		9	9.5	8	8
Length cm										Total				
25	..	18	..	1	..	..	4	..	..	23	1	2	..	..
26	..	13	1	3	..	8	4	..	2	31	3	1	..	3
27	3	18	11	1	1	7	11	3	1	58	..	1	..	5
28	3	10	10	12	2	8	9	6	5	67	2	1	3	11
29	4	6	11	9	3	19	11	5	4	80	3	3	..	2
30	13	1	8	5	4	12	6	9	4	69	6	1	2	4
31	12	6	3	5	4	15	10	7	17	88	7	5	7	7
32	11	2	5	8	2	9	7	8	9	70	9	1	4	14
33	7	6	7	7	4	9	1	7	9	69	9	2	5	5
34	11	..	8	4	3	3	8	4	2	49	7	1	11	8
35	7	..	1	1	5	..	2	5	4	35	5	2	2	7
36	..	2	4	2	1	..	1	4	4	27	1	1	2	3
37	5	1	2	2	5	1	1	4	2	29	4	1	2	3
38	2	1	2	..	..	2	..	1	1	15	2	3	..	3
39	2	..	1	1	2	..	2	2	2	15	2	1	2	2
40	2	..	..	..	2	1	1	..	1	10	..	1	1	1
41	1	..	..	..	3	..	1	1	1	9	1	4	2	1
42	..	..	2	1	2	..	..	..	1	9	1	..	1	..
43	..	2	..	..	2	..	..	..	..	6	..	..	1	..
44	1	..	1	..	2	..	..	1	..	5	..	..	..	..
45	..	..	..	..	3	..	..	..	..	3	..	2	1	..
46	..	..	..	1	3	..	..	..	..	4	..	..	1	2
47	..	..	..	..	3	..	..	..	..	5	..	..	..	..
48	..	..	..	..	..	..	..	..	..	2	..	..	..	..
49	..	..	..	..	..	..	..	..	..	..	..	3	..	..
50	..	..	..	..	..	..	..	..	..	2	..	..	..	..
Total number	84	86	77	63	56	94	79	67	69	781[1])	63	38[4])	47	81
Average length cm	32.73	28.36	31.35	31.16	36.80	30,07	30.29	32.42	32.35	31.98	32.73	36.37	34.47	32.47

Area	A 3													
Date of capture	14, 15 IV. 19	15.IV.19	16, 17 IV. 19	16, 17, 18 IV. 19	17, 18 IV. 19	17,18 IV. 19	17. 18 IV. 19	17, 18 IV. 19	18,19 IV. 19	18, 19 IV. 19	18, 19 IV. 19	19.IV.19	19.IV.19	19.IV.19
Fishing-place	W by S of Hornum	Off Hornum	Off Hornum	NofBlaavandshuk	Esperance Bay	Knude Deep	6 miles WSW of Hornum Light	Off Hornum	North Edge of Amrum Bank	SW of Hornum	Off Hornum	SE of Cancer	Ulvetand	Off Hornum
Depth in m	9	9	11	5	3	6	9	9	9	16	11	11	6	9
Weight of catch in kg	1750	2000	3000	2000	3500	2000	7000	10000	3500	5500	5500	2500	2000	6000
Weight of sample in kg	32	21	24	36	38.5	30	37.5	27	27	27	40.5	31	37.5	31.5
Length cm														
23	..	2	..	..	..	..	..	..	..	..	..	..	..	..
24	1	10	..	..	..	..	..	..	..	..	..	..	..	..
25	26	23	9	1	20	8	7	15	27	31	11	15	5	35
26	41	19	20	3	30	12	12	28	24	23	24	17	17	29
27	31	29	26	7	30	23	23	21	29	16	27	15	12	20
28	22	19	19	15	22	15	28	26	12	19	29	24	28	13
29	21	5	15	18	18	20	28	13	12	19	27	20	21	16
30	10	7	8	27	20	10	21	12	6	6	24	20	26	14
31	5	2	13	24	10	4	8	4	4	4	13	7	18	12
32	3	2	4	9	2	2	12	1	2	2	12	3	11	7
33	..	1	2	4	1	..	5	..	1	..	6	2	8	1
34	..	..	3	6	1	3	3	..	3	..	7	1	6	3
35	..	1	1	6	1	..	3	2	..	..	..	..	..	..
36	..	..	..	..	..	..	..	..	..	1	..	1	..	..
37	..	..	..	..	..	..	..	..	..	..	..	..	..	..
38	..	..	..	..	..	..	..	..	..	..	..	..	..	..
39	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total number	160	120	120	120	155	97	150	122	120	121	180	125	152	150
Average length cm	27.21	26.83	28.23	30.18	27.77	28.07	28.92	27.55	27.24	27.21	28.70	28.18	29.22	27.65

[1]) 53 cm 1 spec. [2]) 55 cm 2 spec. [3]) 56 cm 1 spec. [4]) 55 cm 2 spec., 56 cm 1 spec. [5]) 53 cm 1 spec., 55 cm 2 spec., 56 cm 1 spec.

C 2														Area
10.VIII.16	17.VIII.16	17.VIII.16	17.VIII.16	Aug. 1916	9.IX.16	9.IX.16	11.IX.16	11.IX.16	11.IX.16	26.IX.16	26.IX16	Sept. 1916	1916	Date
55°25′N 5°47′E	55°09′N 6°03′E	55°41′N 6°00′E	55°25′ N 5°40′E		55°08′N 5°46′E	55°09′N 5°54′E	55°26′N 5°55′E	55°40′N 6°06′E	55°43′N 5°42′E	55°33′N 5°47′E	55°25′N 5°48′E			Fishing-place
50	45	48	49		42	42	50	48	50	55	50			Depth
800	1500	1500	800		1000	500	800	800	2000	800	500			Weight of c.
8	7.5	8	7		6	5	7.5	7	10	10	12.5			Weight pr. sc.
				Total								Total	Total	Length cm
1	..	..	..	4	5	8	..	..	6	..	..	19	46	25
6	..	..	2	15	8	24	2	4	2	4	2	46	92	26
6	..	..	6	18	8	19	1	5	2	4	..	39	115	27
4	7	12	7	47	14	17	..	5	3	2	1	42	156	28
9	7	9	6	39	7	9	5	6	7	8	2	44	163	29
9	13	5	10	50	5	7	6	6	2	5	4	35	154	30
7	8	2	6	49	2	2	9	10	6	4	..	33	170	31
9	14	5	12	68	..	3	10	3	1	3	4	24	162	32
1	4	3	8	37	2	1	5	1	7	2	1	19	125	33
7	5	4	5	48	2	2	3	2	2	..	4	15	112	34
7	2	3	2	30	..	..	4	4	..	7	3	18	83	35
..	5	4	..	16	2	1	6	2	1	2	4	18	61	36
2	1	..	1	14	..	..	3	..	..	..	1	4	47	37
..	..	2	..	10	..	..	..	4	5	2	2	13	38	38
..	..	2	2	11	1	..	1	1	..	1	..	4	30	39
2	1	2	..	8	..	..	..	5	4	3	..	12	30	40
..	..	3	1	12	2	..	1	1	5	2	2	13	34	41
..	1	..	..	3	..	..	..	2	..	1	..	3	15	42
..	..	..	..	1	..	..	1	..	..	2	1	4	11	43
2	1	1	1	5	2	1	..	..	5	1	..	9	19	44
..	..	..	..	3	2	..	..	..	..	..	2	4	10	45
..	..	2	1	6	..	..	..	..	..	1	1	2	12	46
..	..	..	..	..	..	..	..	..	..	..	1	1	6	47
..	..	..	..	..	2	..	1	..	2	..	2	7	9	48
..	..	..	..	3	..	..	..	..	..	..	..	..	3	49
..	..	..	..	..	..	..	..	..	..	..	..	..	2	50
72	69	60[3])	70	500[4])	64	94	58	61	60	54	37	428	1709[5])	Total number
31.24	31.88	32.97	31.49	32.70	30.58	27.90	32.90	32.26	33.78	33.11	35.70	31.76	32.15	Average

A 3														Area
22.IV.19	22.IV.19	22, 23 IV. 19	23.IV.19	23.IV.19	23.IV.19.	23.IV.19	23.IV.19	23.IV.19	23.IV.19	24.IV.19	24.IV.19	25.IV.19	24, 25, 26 IV. 19	Date
Esper-ance Bay	Ulve-tand	WSW of Hornum	SW of Hornum	W of Manø	W of Hornum	ESE of Cancer	S of Knude Deep	3 miles SSW of Knude Deep	W of Hornum Light	Off Hornum	W of Manø	3 miles S of Knude Deep	Between Hornum and Amrum	Fishing-place
3	6	9	9	7	9	11	9	6	9	9	7	6	10	Depth in m
1300	1500	6000	2000	2000	3000	3500	2500	3500	2500	1500	3800	250	2000	Weight of c.
30	28	33	24	27	30.5	38.5	30	30	28.5	30	33.5	24.5	24.5	Weight of s.
														Length cm
..	..	..	..	..	..	..	..	..	..	..	..	..	..	23
..	..	..	..	..	..	..	..	..	..	..	..	..	..	24
11	22	18	15	23	15	10	10	7	11	8	9	34	36	25
15	21	16	18	23	14	17	8	11	13	9	12	27	18	26
11	17	18	19	25	16	14	13	14	13	7	8	25	17	27
16	14	21	30	18	16	10	18	21	13	14	17	5	20	28
18	16	8	19	13	17	15	22	15	21	19	16	17	12	29
14	14	13	5	9	18	20	16	9	17	14	18	4	3	30
11	10	12	4	3	15	17	13	14	16	17	12	6	8	31
9	8	5	6	6	4	15	6	9	8	10	9	3	4	32
6	..	6	..	..	7	9	4	10	3	9	12	1	1	33
4	..	3	2	..	2	8	6	8	3	10	4	1	1	34
2	2	2	1	..	..	..	3	2	1	1	5	..	1	35
3	..	2	..	..	..	..	..	..	..	..	..	..	..	36
..	..	1	1	..	..	..	..	..	..	2	..	..	..	37
..	..	..	..	..	..	..	..	..	..	..	..	..	..	38
..	..	..	..	..	..	..	1	..	1	..	..	..	..	39
120	124	125	120	120	124	135	120	120	120	120	122	123	121	Total number
29.11	27.96	28.58	27.87	27.37	28.58	29.34	29.22	29.38	28.95	29.83	29.51	27.07	27.37	Average

Table XXI (continued)

Area	A 3													
Date of capture	26.IV.19	29.IV.19	30.IV.19	30.IV.19	30.IV.19	30.IV.19	30.IV.19	30.IV.19	30.IV.19	30.IV.19	April 1919	3, 4 V. 19	3. 4 V. 19	4.V.19
Fishing-place	Lister Deep	SSW of Knude Deep	W of Romø	6 miles W of Romø	S of Knude Deep Barrel	2miles S by W of Knude Deep	NW of Lister Deep	Off Sønderho	At Romø Knude	At Blaavand		16 miles S of Graa Deep	S of Fanø	Red Cliff Sand
Depth in m	8	7	6	6	8	9	7	5	7	3		8	9	8
Weight of catch in kg	900	1100	2500	2000	2000	1800	1500	300	2500	2500		200	2500	1600
Weight of sample in kg.	30	32.5	28	30	29.5	22.5	30	37.5	25.5	28		36	38	27
Length cm											**Total**			
23	..	..	..	..	..	..	..	..	..	..	2	..	..	..
24	..	..	5	..	6	11	4	11	16	5	69	..	..	3
25	12	11	3	3	5	25	2	16	10	13	562	5	..	5
26	10	10	15	4	13	31	10	14	20	23	671	10	4	16
27	13	17	13	12	13	26	14	19	20	24	697	7	5	16
28	20	21	23	20	20	14	21	24	26	16	729	19	10	27
29	14	17	16	22	21	13	21	23	13	18	659	20	15	18
30	18	20	12	16	18	7	16	18	15	12	537	27	32	20
31	12	12	9	22	20	2	11	12	2	..	388	13	23	5
32	11	12	11	10	8	1	5	11	4	4	251	15	13	5
33	5	7	8	8	8	1	8	1	..	5	150	5	12	4
34	2	1	5	5	..	..	6	1	..	4	112	5	6	..
35	3	2	..	..	..	..	3	..	..	..	42	..	2	1
36	..	..	..	..	..	..	..	..	..	..	7	..	2	..
37	..	..	..	..	..	..	..	..	..	..	4	..	..	..
38	..	..	..	..	..	..	..	..	..	..	..	..	..	..
39	..	..	..	..	..	..	..	..	..	..	2	..	..	..
40	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Total number	120	130	120	122	132	131	121	150	126	124	4882	126	125	120
Average length cm	28.99	28.97	28.91	29.65	28.84	26.74	29.21	28.07	27.28	27.82	28.35	29.48	30.60	28.38

Area	A 3													
Date of capture	4, 5 V. 19	5. V. 19	5. V. 19	5. V. 19	5. V. 19	5. V. 19	5. V. 19	5. V. 19	5. V. 19	5. V. 19	5. V. 19	5. V. 19	5. V. 19	5, 6 V. 19
Fishing-place	Off Manø	Off Manø	Off Blaavand	Off Blaavand	Off Romø	Off Fanø	N of Lister Deep	Off Romø	Off Hornum	W of Romø	Blaavandshuk	Off Manø	W of List	Off Knude Deep
Depth in m	11	4	3	6	6	4	6	6	11	9	3	8	11	4
Weight of catch in kg	3000	2000	1400	800	1300	500	2500	1000	5000	1000	750	1500	3000	2500
Weight of sample in kg.	27.5	30	27	30	31.25	28.5	28	28	30.5	32	28	28.5	39.5	27
Length cm														
23	5	..	..	..	..	..	..	..	..	..	..	1	3	..
24	6	..	..	3	5	3	..	..	3	..	..	1	4	..
25	7	3	10	2	..	8	6	8	..	7	7	9	4	1
26	9	12	10	9	5	11	12	6	4	13	12	16	7	8
27	18	13	20	19	17	24	17	15	10	20	23	19	7	20
28	19	16	23	15	22	18	19	25	14	14	28	22	12	22
29	12	22	30	28	24	20	15	30	19	9	15	12	13	16
30	20	13	16	13	15	14	20	15	19	20	16	20	12	19
31	8	17	6	15	9	11	20	12	18	9	10	12	19	11
32	9	9	4	10	16	6	8	5	11	11	2	6	13	10
33	6	8	3	2	8	6	10	5	9	11	1	4	10	8
34	4	4	4	2	4	4	1	5	6	8	..	..	13	4
35	..	3	..	4	..	..	..	..	4	..	..	2	4	2
36	..	..	..	..	..	..	1	..	..	..	..	..	..	..
37	..	..	..	..	..	..	..	..	4	..	..	..	4	..
38	..	..	..	..	..	..	..	..	..	..	..	..	..	..
39	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total number	123	120	126	122	125	125	129	126	121	122	114	124	125	121
Average length cm	28.50	29.45	28.52	29.10	29.30	28.62	29.18	28.95	30.23	29.28	28.19	28.48	30.19	29.37

A 3														Area
4. V. 19	4. V. 19	4. V. 19	4. V. 19	4. V. 19	4. V. 19	4. V. 19	4,5.V.19	4, 5. V. 19	4, 5. V. 19	4, 5. V. 19	4, 5. V. 19	4. V. 19	4, 5 V. 19	Date
Closely off Blaavand Light	W of Romø	At Sønderho Entrance Buoy	3 miles SW of Sønderho	3 miles S of Knude Deep	S of Ulvetanden	12 miles S by W of Graa Deep	Off Hornum	WSW of Hornum	Abreast of Sønderho	Red Cliff Sand	Ulvetanden	Off Manø	Off Romø	Fishing-place
8	6	9	6	11	4	8	8	8	6	12	3	6	6	Depth in m
1000	3000	1500	1000	2500	1100	1500	300	3000	900	1400	800	2600	1500	Weight of c.
30	22.75	30	25	27	33	30	36.5	31.5	27	34.5	29	33	33.5	Weight of s.
														Length cm
..	2	..	..	..	2	..	..	..	..	..	3	1	3	23
3	6	6	1	6	2	..	2	2	..	..	5	1	4	24
4	23	7	8	5	4	1	..	3	2	4	7	3	4	25
6	21	6	13	17	8	10	6	5	12	11	8	2	7	26
15	22	8	18	14	7	16	7	12	11	16	14	14	11	27
11	33	17	22	22	13	22	13	12	28	9	20	19	17	28
18	12	17	18	14	15	20	17	17	20	10	23	17	19	29
31	8	17	12	11	17	20	12	22	12	8	17	14	22	30
10	7	16	15	22	15	13	16	12	12	15	17	14	16	31
16	3	11	7	5	14	9	11	20	7	14	8	5	10	32
9	..	6	1	6	8	3	9	6	5	13	4	8	6	33
5	..	6	2	..	8	6	10	5	2	4	..	1	5	34
2	..	3	2	..	4	1	6	3	..	8	..	..	3	35
..	..	..	1	..	2	1	1	2	..	4	1	..	..	36
..	..	..	..	..	2	..	..	..	1	4	..	..	..	37
..	..	..	..	..	..	..	1	..	..	..	..	..	..	38
..	..	..	..	..	..	..	..	..	..	..	..	..	..	39
..	..	..	..	..	..	..	..	..	..	..	..	..	..	40
130	137	120	120	122	121	122	111	121	112	120	127	99	127	Total number
29.63	27.23	29.38	28.68	28.53	29.75	29.33	30.44	29.94	29.01	30.42	28.65	29.18	29.29	Average

A 3														Area
5, 6 V. 19	5, 6 V. 19	5, 6 V. 19	6. V. 19	6. V. 19	6. V. 19	6, 7.V.19	6, 7.V.19	7. V. 19	8. V. 19	8. V. 19	8. V. 19	8. V. 19	8, 9.V.19	Date
Off Sønderho	SW of Hornum Light	Off Hornum	E of RedCliff	4 miles SSW of Knude Deep	6 miles S of Graa Deep	W by S of Manø	Between Hornum and List	Off Manø	W of Romø	Off Sønderho	1 mile E of Knude Deep Buoy	WNW of Romø	Off Knude Deep	Fishing-place
4	8	9	10	8	8	8	13	8	8	4	4	10	8	Depth in m
2000	2000		1800	1500	1300	2000	1500	3500	2500	1500	7000	2500	1600	Weight of c.
28.5	35	28	28	36	23	27.5	31	28	27.5	26.5	29	28	31.5	Weight of s.
														Length cm
2	3	..	4	2	..	..	..	..	..	..	..	..	..	23
1	4	4	4	..	2	4	2	7	2	..	..	6	2	24
6	6	4	4	..	11	21	4	13	2	5	3	7	3	25
11	7	17	4	8	29	30	9	9	12	15	16	19	4	26
16	9	25	13	11	27	33	10	32	30	21	10	15	11	27
15	13	20	20	10	19	34	14	25	20	30	30	19	12	28
21	23	17	19	14	12	11	13	21	20	23	15	17	11	29
19	15	19	17	14	7	6	17	13	20	12	22	17	20	30
15	11	7	15	14	3	2	9	8	8	8	7	14	20	31
9	11	2	13	11	4	2	14	3	6	2	9	7	11	32
3	5	1	5	13	2	1	13	..	2	3	5	4	8	33
3	7	5	2	6	..	1	3	1	..	3	..	..	5	34
3	7	1	..	8	..	..	8	..	..	1	1	3	4	35
1	4	..	..	5	..	..	3	1	..	..	..	..	3	36
..	..	1	..	..	..	..	3	..	..	..	..	..	..	37
..	..	..	..	..	..	..	..	..	..	..	..	..	..	38
..	..	..	..	..	..	..	..	..	..	..	..	..	..	39
125	125	124[1]	120	116	116	145	122	133	122	123	118	128	114	Total number
29.06	29.65	28.40	28,98	30.48	27.44	27.14	30.23	27.85	28.41	28.43	28.82	28.50	30.11	Average

[1] 43 cm 1 spec.

Table XXI (continued)

Area	A 3													
Date of capture	8, 9 V. 19	8, 9 V. 19	8, 9 V. 19	8, 9 V. 19	8,9 V. 19	9. V. 19	9. V. 19	9. V. 19	9. V. 19	9.V. 19	9. V. 19	9. V. 19	9. V. 19	10.V.19
Fishing-place	Off Red Cliff	Off Lister Deep	Off Amrum	4 miles S of Knude Deep	S of Knude Deep	Off Blaa-vand	Off Sønder-ho	W of Romø	Off Sønder-ho	W of Sønder-ho	Off Sønder-ho	By Ulve-tanden	Off Knude Deep Buoy	S of Sønder-ho
Depth in m	8	8	10	8	8	4	4	7	4	6	4	2	8	8
Weight of catch in kg	2000	3000	3000	1500	4000	1000	1000	2500	2700	1500	700	1000	3000	1000
Weigth of sample in kg.	25	34	28.5	29	28	27.5	27.5	34	26	30	28	28.5	30	28
Length cm														
22	..	..	..	2	..	..	..	..	..	..	..	..	..	..
23	8	..	..	..	..	..	..	..	..	..	..	2	3	2
24	13	17	3	..	5	3	5	5	..	6	2	..	6	13
25	13	32	10	15	7	12	6	16	17	12	8	6	2	22
26	8	50	18	20	21	23	20	28	21	28	13	14	13	39
27	17	43	25	13	21	28	21	23	27	36	25	17	9	32
28	10	33	23	17	19	23	22	25	29	26	25	25	10	21
29	13	19	20	18	20	23	20	24	15	13	20	25	17	19
30	18	1	10	17	18	12	11	15	10	9	15	21	22	3
31	8	..	8	13	7	6	7	5	5	5	13	6	14	5
32	7	..	4	5	3	2	7	3	3	8	3	5	5	2
33	1	..	2	5	3	1	1	5	2	..	5	4	9	2
34	1	..	1	1	..	..	3	..	1	2	..	..	8	..
35	..	..	1	1	..	..	1	..	..	..	..	..	1	..
36	..	..	..	..	..	..	..	..	..	..	..	..	..	..
37	..	..	..	..	..	..	..	..	..	..	..	..	1	..
38	..	..	..	..	..	..	..	..	..	..	..	..	..	..
39	..	..	1	..	..	..	..	..	..	..	..	..	..	..
Total number	117	195	126	127	124	133	124	149	130	145	129	125	120	160
Average length cm	27.56	26.53	28.00	28.31	28.00	27.67	28.18	27.71	27.68	27.57	28.33	28.42	29.27	26.88

Area	A 3												
Date of capture	11.V.19	11.V.19	11.V.19	11.V.19	11.V.19	11, 12 V. 19	12. V. 19	12. V. 19	12. V. 19	12. V.. 19	12. V. 19	12. V. 19	12. V. 19
Fishing-place	Off Sønderho Buoy	Off Manø	S of Knude Deep	5 miles SW by S of Knude Deep	4 miles S of Knude Deep Buoy	4 miles W of Manø	S of Graa DeepBuoy	WNW of Manø	Off Knude Deep	Esperance Bay	WSW of Red Cliff Light	2 milesSW of Graa Deep Bar	S of Knude Deep
Depth in m	8	6	6	9	8	9	11	8	6	2—3	11	9	7
Weight of catch in kg	1000	1500	900	2000	1500	1400	500	750	700	700	2000	400	3500
Weight of sample in kg.	27	27.5	26.5	33	28.5	29	33.5	29.5	25	27	37.5	33	30
Length cm													
23	..	..	..	..	..	1	..	..	6	..	..	..	..
24	3	3	3	..	1	1	3	6	20	5	..	..	2
25	3	4	8	..	1	5	3	11	30	15	..	3	6
26	13	15	13	7	10	22	5	25	25	30	2	2	11
27	20	17	30	14	20	26	10	20	26	17	..	7	14
28	25	23	30	16	20	21	12	17	16	28	4	13	18
29	22	22	18	14	17	21	12	20	5	14	9	12	17
30	16	13	10	14	16	9	12	14	5	10	14	22	16
31	15	10	5	14	10	13	17	10	8	5	22	19	11
32	5	3	6	10	14	2	10	8	1	2	19	22	7
33	1	7	3	14	5	4	10	1	2	3	14	9	6
34	1	2	..	3	3	1	10	3	..	1	11	5	3
35	..	..	1	6	2	..	5	..	..	2	9	5	6
36	1	..	..	4	1	1	7	1	1	..	6	3	3
37	..	..	..	5	..	..	4	..	..	..	5	..	..
38	..	..	..	..	..	..	..	..	..	..	5	..	..
39	..	..	..	..	..	..	..	..	..	..	5	..	..
Total number	125	119	127	121	120	127	120	136	145	132	125	122	120
Average length cm	28.57	28.55	28.06	30.50	29.28	28.20	30.69	28.19	26.52	27.62	32.58	30.58	29.35

A 3														Area
10, 11 V. 19	10, 11 V. 19	10, 11 V. 19	10, 11 V. 19	10, 11 V. 19	10, 11 V. 19	10, 11 V. 19	10, 11 V. 19	10, 11 V. 19	10, 11 V. 19	11. V. 19	11. V. 19	11. V. 19	11. V. 19	Date
At Knude Deep	Off Knude Deep	S of Sønder-ho	At Ulve-tanden	SW of Knude Deep	SW of RedCliff Light	At Juvre Deep	SW by S of Sønder-ho	Off Romø	SSW of Graa Deep	SW of Fanø	At Romø Flat	Esperance Bay	Off Knude Deep	Fishing-place
6	6	7	4	8	11	8	8	11	11	4	8	4	9	Depth in m
3000	1000	2500	1000	1700	4000	2000	3000	1500	2000	1200	1000	1000	350	Weight of c.
26.5	—	—	29	26	32.5	26	27	27	24	28	30	—	30	Weight of s.
														Length cm
..	..	..	..	..	..	..	..	..	..	..	..	..	..	22
..	2	2	..	..	..	1	..	..	5	1	..	1	2	23
5	15	1	1	2	4	1	1	..	17	3	..	1	5	24
6	25	7	3	10	7	10	7	2	24	15	3	15	10	25
19	35	24	15	29	7	23	10	5	31	13	11	31	8	26
24	20	36	20	25	19	16	20	15	32	25	19	25	15	37
12	20	21	20	22	17	18	20	28	23	28	28	17	12	28
19	14	10	22	15	13	15	20	13	11	13	18	17	12	29
10	10	11	9	15	17	17	20	18	6	20	17	10	12	30
13	4	3	12	5	10	7	10	15	1	10	12	5	13	31
6	3	2	11	1	12	6	7	5	..	7	7	5	13	32
3	2	3	5	5	10	5	6	7	..	..	3	..	9	33
5	..	..	2	..	7	..	..	1	..	..	3	..	3	34
..	..	..	1	1	7	1	2	..	..	..	2	..	4	35
..	..	..	..	1	..	..	..	1	..	..	2	1	2	36
..	..	..	..	..	..	1	..	..	..	..	..	..	..	37
1	..	..	..	..	..	..	..	..	..	..	..	..	..	38
..	..	..	..	..	..	..	..	..	..	..	..	..	..	39
123	150	120	121	131	130	121	123	110	150	135	125	128	120	Total number
28.46	26.89	27.54	28.83	27.87	29.51	28.28	28.79	29.20	26.45	27.99	29.03	27.52	29.19	Average

A 3														Area
12, 13 V. 19	13.V.19	13.V.19	13.V.19	13.V.19	13.V.19	13. V. 19	13, 14 V. 19	13,14 V. 19	13, 14 V. 19	14. V. 19	14. V. 19	14. V. 19	14. V. 19	Date
SSW of Knude Deep	W of Manø	Off Skal-lingen	Esper-ance Bay	At Romø Flat	S of S. Jessen's Sand	At Ulve-tanden	Ulve-tanden	6 miles W of Manø	At Red Cliff Light	Esperance Bay	Off Blaa-vands-huk	SW of Graa Deep	Esperance Bay	Fishing-place
9	8	4	5	9	8	4	6	6	13	2	4	15	6	Depth in m
3500	800	300	500	2500	500	350	1000	600	1400	800	900	3000	300	Weight of c.
30	28	31.5	27.5	30.5	28	27	27.5	36	27	28.5	27	26	28.5	Weight of s.
														Length cm
..	..	..	..	..	..	15	8	..	10	2	..	..	1	23
..	2	2	3	..	1	16	8	5	21	6	2	..	6	24
1	8	9	10	3	10	12	12	7	10	16	12	..	12	25
2	16	13	21	10	10	15	18	8	17	35	30	..	24	26
10	25	7	25	20	22	22	22	14	16	21	28	..	16	27
23	32	21	25	22	15	15	18	19	20	22	25	2	16	28
22	18	11	15	15	17	20	13	15	15	16	20	5	14	29
15	15	13	15	15	15	15	16	17	20	13	11	8	14	30
13	8	6	6	17	12	5	11	22	2	5	10	19	6	31
11	5	10	6	5	13	2	5	10	3	3	2	9	2	32
5	1	9	3	6	2	3	2	10	2	3	..	6	5	33
5	..	7	1	2	1	..	1	5	..	..	..	6	2	34
3	1	4	..	2	1	..	..	3	..	1	..	6	..	35
..	..	3	..	1	..	1	..	..	..	..	..	6	..	36
..	..	5	..	2	..	1	..	..	..	..	..	1	..	37
..	..	..	..	..	1	..	..	..	..	..	..	1	..	38
..	..	..	..	..	..	..	..	..	..	..	..	1	..	39
110	131	120	130	120	120	142	134	135	136	143	140	70	118	Total number
29.76	28.11	29.76	27.99	29.24	28.77	27.14	27.61	29.37	27.04	27.43	27.63	32.29	27.80	Average

Table XXI (continued)

Area	A 3												
Date of capture	14.V.19	14.V.19	14.V.19	14.V.19	14.V.19	14, 15, 16 V. 19	15, 16 V. 19	15, 16 V. 19	15. 16 V. 19	15, 16 V. 19	16. V. 19	16. V. 19	16. V. 19
Fishing-place	WSW of Sønderho Buoy	Off Blaavandshuk	Esperance Bay	Near List	S of Graa Deep Buoy	5 miles W of Knude Deep	6 miles W of Blaabjerg	At Lister Buoy	Off Vesterland Baths	W of Lister Deep	Off Knude Deep	At Lister Deep	3 miles S of Knude Deep
Depth in m	9	6	17	9	8	9	19	9	11	11	6	8	8
Weight of catch in kg	800	900	400	1500	500	1500	1200	3000	800	3000	1000	500	2500
Weight of sample in kg.	26.5	27.5	33	39	35.5	39	57	38	36	42	28.5	27	27
Length cm													
23	2	..	..	..	..	..	..	..	..	..	..	..	..
24	2	..	8	..	..	..	..	..	..	..	1	5	..
25	6	17	8	..	4	..	..	..	..	..	7	6	7
26	10	27	7	2	4	..	2	8	5	..	13	15	27
27	21	32	20	5	14	4	6	14	5	3	23	25	31
28	25	16	19	5	14	4	..	9	9	5	26	22	27
29	25	20	8	14	20	5	..	15	12	8	11	11	17
30	20	8	3	14	24	15	..	22	22	10	15	5	8
31	5	6	13	14	13	21	4	15	17	10	13	10	6
32	4	7	14	13	3	19	13	8	8	12	7	6	3
33	2	..	5	7	10	12	9	8	8	13	5	7	3
34	..	..	9	6	7	12	10	12	8	16	..	2	..
35	..	1	6	7	5	14	10	3	7	10	..	2	2
36	..	..	..	7	5	6	11	4	7	8	..	1	..
37	..	..	2	4	..	8	10	..	3	8	..	2	..
38	..	..	..	2	..	..	10	3	4	9	..	..	..
39	..	..	..	2	..	..	8	..	3	5	..	..	..
40	..	..	..	3	..	..	7	..	..	3	..	..	..
41	..	..	..	..	..	..	6	..	..	..	..	..	..
42	..	..	..	..	..	..	7	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..	..	1	..
Total number	122	134	122	105	123	120	113	121	118	120	121	120	131
Average length cm	28.24	27.64	29.30	31.97	30.05	32.33	35.57	30.29	31.53	33.43	28.49	28.58	27.89

Area	A 3												
Date of capture	19.V.19	19.V.19	20.V.19	20.V.19	20.V.19	20. V. 19	20. V. 19	20. V. 19	20. V. 19	20. V. 19	20, 21 V. 19	20, 21 V. 19	20, 21 V. 19
Fishing-place	Off Fanø Baths	Close at Red Cliff	W of Romø	Between Manø and Fanø	8 mls NN W of Graa Deep Buoy	5 miles S of Knude Deep	S of Blaavandshuk Light	Off North-edge of List	Off Fanø Baths	W of Romø	Off List	S of List Entrance Buoy	Esperance Bay
Depth in m	4	8	8	9	4	9	2	9	2	8	9	11	3
Weight of catch in kg	500	3000	1000	1500	800	600	800	2500	2500	800	3000	2500	1000
Weight of sample in kg.	27	26	28.5	24.5	28	26.5	26.5	48	27.5	25.5	27	39	26.5
Length cm													
23	1	..	..	1	1	4	5	..	..	..	..	3	1
24	2	1	..	10	1	10	20	..	8	5	5	..	16
25	22	20	25	20	11	11	18	..	17	15	5	1	23
26	28	37	35	25	33	22	30	..	27	32	4	5	18
27	30	31	30	25	30	30	31	..	30	30	10	3	20
28	25	25	30	25	28	26	27	..	23	26	10	8	17
29	13	5	10	11	17	17	10	..	15	12	12	20	18
30	10	10	8	7	12	12	3	8	15	5	17	12	10
31	5	6	5	2	6	3	2	11	6	2	22	12	8
32	3	3	3	3	2	2	3	17	..	3	12	12	1
33	1	1	2	2	2	2	..	15	..	1	3	15	4
34	1	..	..	..	..	1	1	20	..	..	12	5	..
35	..	1	..	..	2	..	..	18	..	..	5	8	..
36	..	..	1	..	..	..	..	11	..	..	3	7	..
37	..	..	..	..	..	..	..	10	..	1	..	5	2
38	..	..	..	..	..	..	..	6	..	..	..	5	..
39	..	..	..	..	..	..	..	6	..	..	..	..	..
40	..	..	..	..	..	..	..	..	..	..	..	..	..
Total number	141	140	149	131	145	140	150	122	141	132	120	121	138
Average length cm	27.33	27.27	27.30	27.03	27.68	27.34	26.55	28.08	27.26	27.13	30.11	31.31	27.35

A 3														Area
16.V.19	16.V.19	16.V.19	16.V.19	18.V.19	18.V.19	18.V.19	18, 19 V. 19	19. V. 19	19. V. 19	19. V. 19	19. V. 19	19. V. 19	19. V. 19	Date
At Manø Flat	S of Graa Deep	Off Blaa-vand	2 miles S of Knude Deep	W of Fanø Baths	Lister Deep	Near Manø	At Lister Buoy	Off Fanø	Off Juvre Deep and GraaDeep	2 miles of Fanø Baths	8 miles SW of Sønderho	At Lister Buoy	At Red Cliff Light	Fishing-place
8	4	6	8	5	9	8	9	8	8	4	9	8	8	Depth
800	1000	800	1200	600	4000	700	1500	700	300	1500	900	3000	1600	Weight of c.
28	27	26	26	26.5	29	29	31	27.5	26	26	27.5	31	40	Weight of s.
														Length cm
..	..	..	1	..	5	..	..	7	..	5	..	..	5	23
3	2	5	5	10	2	3	..	10	3	10	2	..	5	24
5	6	15	6	25	7	10	6	17	3	18	15	5	10	25
28	22	26	17	22	10	10	8	22	10	27	22	2	6	26
30	21	30	30	16	12	17	11	35	22	31	20	2	5	27
25	21	25	26	17	17	16	17	30	25	22	20	15	15	28
22	16	21	15	26	12	17	17	22	12	22	16	5	15	29
6	9	10	11	11	15	21	17	6	8	5	16	17	20	30
3	6	3	6	3	6	6	7	5	11	2	10	13	20	31
2	6	3	1	1	7	5	15	1	7	1	3	12	8	32
1	2	..	2	1	5	10	6	..	7	1	5	12	8	33
5	2	..	..	1	5	5	4	..	1	..	1	9	8	34
..	..	..	1	1	5	1	6	..	..	..	..	2	3	35
2	2	..	..	..	1	..	4	..	..	..	..	3	1	36
1	..	..	..	..	1	..	..	..	1	..	..	..	6	37
..	..	..	..	..	1	..	..	..	..	..	..	1	..	38
..	..	..	..	..	..	..	..	..	..	..	..	2	..	39
..	..	..	..	..	..	..	..	..	..	..	..	..	..	40
..	..	..	..	..	..	..	..	..	..	..	..	..	..	41
..	..	..	..	..	..	..	..	..	..	..	..	..	..	42
..	..	..	..	..	..	..	..	..	..	..	..	..	..	46
133	115	138	121	134	111	121	118	155	110	144	130	100	135	Total number
27.98	28.20	27.38	27.75	27.28	29.07	28.87	29.82	27.02	28.69	26.91	28.03	30.89	29.67	Average

A 3														Area
20, 21 V. 19	21.V.19	21.V.19	21.V.19	21.V.19	21.V.19	21, 22 V. 19	21, 22 V. 19	21, 22 V. 19	21, 22 V. 19	22. V. 19	22. V. 19	22. V. 19	22. V. 19	Date
Esperance Bay	S of Lister Deep Buoy	W of Sønderho	Off Romo	Off List	8 mls. SW of Knude Deep Beacon	S of Fanø Baths	SW byW of Graa Deep	1900 m S of Lister Buoy	S of Luba Buoy	4 miles W of Sønderho	Off Fanø Baths	S of Graa Deep Buoy	Off Manø	Fishing place
11	11	6	9	15	9	6	15	9	9	6	2	9	8	Depth
1500	1700	600	1000	1500	850	9000	1000	1500	2000	500	400	3000	2500	Weight of c.
38	27.5	26	28.5	28	30	32	39	29.5	33	27	28	27	28	Weight of s.
														Length cm
..	..	..	..	10	..	..	..	2	3	31	1	..	1	23
4	2	10	..	15	1	16	..	5	3	49	1	1	13	24
4	8	26	2	33	11	25	4	8	4	39	17	13	33	25
9	21	36	4	35	21	25	8	5	11	24	23	20	30	26
12	30	18	25	30	21	30	5	13	17	18	30	25	34	27
12	30	23	32	15	21	20	8	20	18	7	22	22	20	28
11	13	16	21	10	31	21	5	10	11	9	13	17	11	29
9	8	5	16	2	9	16	10	15	12	1	12	10	7	30
15	2	2	13	3	5	17	13	11	11	..	5	5	4	31
15	2	3	4	2	9	11	10	7	4	..	5	3	2	32
13	3	1	1	..	6	14	19	7	8	..	2	1	2	33
8	1	..	..	1	3	..	13	7	6	..	..	2	..	34
7	2	..	..	..	..	..	9	5	4	..	..	1	..	35
5	..	..	..	..	1	5	8	4	3	..	..	..	..	36
3	1	..	..	..	..	..	7	6	2	..	..	..	..	37
..	..	..	..	..	..	..	..	..	..	..	..	..	..	38
..	..	..	..	1	..	..	4	..	..	..	..	..	..	39
..	..	..	..	..	..	..	..	..	3	..	..	..	..	40
127	123	140	118	157	139	200	123	125	120	178	131	120	157	Total number
30.40	27.86	26.86	28.63	26.34	28.40	28.20	31.89	29.78	29.50	25.06	27.59	27.83	26.76	Average

Table XXI (continued)

Area	A 3												
Date of capture	22.V.19	22.V.19	22.V.19	22.V.19	22.V.19	22. V. 19	22. V. 19	22. V. 19	22. V. 19	22. V. 19	22. V. 19	22. V. 19	22, 23 V. 19
Fishing-place	S of Fanø Baths	SW of Svenske Knolde	At Romø Flat	SW of Sønder-ho	At Ulve-tanden	Lister Deep	W of Romø	Off Fanø	At Koresand	WSW of List	NE of Knude Deep	Between Romø and Manø	Abreast of Romø
Depth in m	2	6	8	8	5	8	9	1	6	11	3	8	8
Weight of catch in kg	150	800	600	1000	2000	4050	900	900	1000	1000	500	450	800
Weight of sample in kg.	29	27	26	33	27	27	28	27.5	26.5	31.5	26	25.5	28
Length cm													
23	..	..	1	..	8	4	..	..	1	..	..	2	..
24	10	2	5	..	17	3	..	2	12	..	2	6	2
25	27	5	18	..	20	10	5	14	26	..	16	27	16
26	37	25	40	5	14	17	28	35	31	2	15	35	21
27	35	35	26	8	25	9	37	27	29	13	35	36	32
28	32	17	20	20	13	15	31	21	14	20	23	20	30
29	8	15	20	17	14	10	18	15	16	24	15	6	14
30	5	12	6	17	12	15	9	6	6	26	9	7	13
31	5	7	1	21	6	10	6	6	4	11	7	1	3
32	..	5	..	12	3	8	3	2	2	11	3	..	3
33	1	..	1	4	..	6	1	3	2	5	1	..	..
34	..	..	1	7	2	7	1	..	..	6	..	..	2
35	..	1	1	5	..	2	..	2	..	2	..	..	2
36	..	..	..	4	..	1	..	..	..	..	..	..	..
37	..	..	..	..	2	..	1	..	..	..	..	..	2
38	..	..	..	..	..	..	..	..	..	..	..	..	..
39	..	..	..	..	..	1	..	..	..	..	..	..	..
40	..	..	..	..	..	1	..	..	..	..	..	..	..
41	..	..	..	..	1	1	..	..	..	..	..	..	..
Total number	160	124	140	120	137	120	140	133	143	120	126	140	140
Average length cm	26.80	27.83	27.06	30.28	27.20	29.06	27.84	27.51	26.85	29.76	27.60	26.59	27.82

Area	A 3												
Date of capture	25.V.19	25.V.19	25.V.19	25.V.19	25.V.19	25. V. 19	25. V. 19	25. V. 19	25. V. 19	25, 26 V. 19	26. V. 19	26. V. 19	26. V. 19
Fishing-place	2 miles N of Lister Deep	W of Sønder-ho	7 miles SW of Manø	7 miles W of Graa Deep	N of Lister Deep	10 miles SW of Amrum	Off Red Cliff	1 mile S of Lister Entrance Buoy	1 mile S of Lister Deep	1.5 mile WNW of Blaabjerg	2800 m S of Lister Buoy	1900 m SSW of Lister Deep	22 miles NW of Lister Deep
Depth in m	11	6	12	15	9	15	11	11	8	19	9	8	10
Weight of catch in kg	1000	600	900	150	2000	4000	1000	1000	700	3000	1200	2000	1100
Weight of sample in kg.	34.5	26	31.5	45	45	42	63.5	27	28	55.5	27	30	28.5
Length cm													
22	..	..	..	..	..	..	..	..	..	..	..	..	..
23	..	..	..	..	1	5	..	1	..	..	..	1	..
24	3	5	..	..	5	5	..	2	13	..	1	2	1
25	..	31	3	3	10	4	6	8	10	..	5	5	5
26	3	33	7	5	10	4	6	20	27	..	13	10	13
27	8	25	12	5	25	6	..	28	22	6	30	25	17
28	7	20	22	4	22	4	..	28	35	6	30	20	26
29	15	12	19	4	23	10	..	10	11	6	25	16	22
30	17	7	25	13	26	11	6	8	7	..	7	16	15
31	15	3	11	13	25	14	..	10	4	6	7	11	10
32	12	1	8	14	15	9	7	8	6	8	3	6	5
33	9	..	5	10	11	15	7	1	..	8	2	3	2
34	13	1	5	11	4	13	22	..	1	11	1	2	3
35	10	1	3	15	3	9	18	..	2	13	..	3	1
36	5	..	..	9	..	7	18	..	1	13	..	..	..
37	..	..	..	7	..	6	11	1	..	12	..	..	..
38	..	..	..	3	..	4	7	..	1	10	..	..	..
39	2	..	..	5	..	4	7	..	..	13	..	..	..
40	..	..	..	..	..	..	6	..	..	9	..	..	..
41	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	..
Total number	119	139	120	121	180	130	121	125	140	121	124	120	120
Average length cm	31.16	26.91	29.46	32.48	29.17	31.45	34.32	27.98	27.68	34.69	28.10	28.67	28.63

A 3														Area
22, 23 V. 19	22, 23 V. 19	22, 23 V. 19	22, 23 V. 19	23.V.19	23.V.19	23. V. 19	23. V. 19	24. V. 19	24. 25 V. 19	24, 25 V. 19	24, 25 V. 19	25. V. 19	25. V. 19	Date
At Lister Buoy	SW of Graa Deep Gas Buoy	W of Lister Buoy	W of Blaa-bjerg	SW of Manø	S of Manø	S of Lister Buoy	Off Sønderho	Off Amrum Bank	3 miles W of List	3 miles W of Lister Deep	9 miles W of Blaabjerg	Between Romø and List	At Lister Deep	Fishing-place
11	14	13	19	15	8	10	6	15	11	11	17	8	9	Depth
1500	1000	1000	3500	300	800	1000	400	800	2000	700	1000	1400	500	Weight of c.
28	42	26	69	29.5	25.5	27	28	27	28	28.25	70.5	28	31.5	Weight of s.
														Length cm
15	..	5	..	..	..	..	..	..	..	..	..	..	..	23
31	..	7	..	5	5	..	1	8	..	1	..	3	1	24
35	5	21	..	16	7	10	3	6	2	3	..	..	3	25
30	5	32	..	31	20	15	30	15	10	19	5	10	9	26
25	4	25	..	35	16	25	41	18	22	24	..	18	8	27
10	6	27	..	23	32	32	24	11	25	24	..	26	17	28
2	8	12	7	7	21	22	14	12	25	14	5	25	22	29
3	10	7	6	9	8	10	13	11	12	12	6	25	13	30
2	13	5	9	7	5	2	2	11	12	5	9	10	14	31
..	14	3	9	2	5	1	3	7	6	7	8	2	12	32
..	18	1	7	..	1	..	..	5	5	3	10	..	7	33
1	12	..	9	..	3	2	3	3	2	1	9	..	7	34
..	7	..	16	..	..	1	2	2	1	1	9	..	7	35
..	8	..	8	..	..	..	..	4	1	1	8	..	..	36
..	5	..	11	1	..	..	3	3	..	..	12	1	..	37
..	5	..	10	1	..	1	..	2	1	..	7	..	..	38
1	..	..	10	..	..	..	..	..	..	..	9	..	..	39
..	..	..	11	1	..	..	..	2	..	..	9	..	..	40
..	..	..	8	..	..	..	..	..	..	..	..	..	..	41
155	120	145	121	138	123	121	139	120	124	115	120[1]	120	120	Total number
25.69	31.87	26.99	35.37	27.42	27.98	27.97	28.02	29.31	28.99	28.35	35.43	28.60	29.88	Average

A 3												B 4	Area
28, 29 V. 19	28, 29 V. 19	29.V.19	29.V.19	29.V.19	29.V.19	29, 30 V. 19	30. V. 19	30. V. 19	30. V .19	30. V. 19	30. V. 19	May 1916	25. V. 19	Date
Off Hornum Light	5 miles W of Graa Deep	4 miles N of Lister Deep	Between Manø and Fanø	3 miles N of Lister Deep	7 miles W of Blaa-bjerg	10 miles S of Graa Deep	8 miles W of Romø	1 mile NNW of Lister Buoy	NW of Graa Deep	At Red Cliff Sand	1 mile S of Lister Deep		60 miles W by S of Graa Deep	Fishing-place
13	13	11	11	11	17	5	9	11	8	8	9		30	Depth
500	260	1300	2000	3000	1000	1750	1500	1400	1100	500	2000		1000	Weight of c.
28.5	40.25	27	28	30	52.5	31.5	30	31.5	27	24	28		32 5	Weight of s.
												Total		Length cm
..	..	..	..	..	..	..	..	..	..	..	..	2	..	22
2	3	..	..	..	..	..	..	..	1	3	..	245	..	23
2	3	3	2	5	..	2	4	2	2	5	1	822	..	24
5	6	5	13	4	..	3	6	5	10	23	10	1872	..	25
8	5	20	22	6	..	6	4	6	20	20	18	3204	..	26
17	5	21	34	23	6	6	18	15	20	36	30	3976	..	27
17	9	29	18	15	6	13	23	13	15	20	20	3943	1	28
20	8	22	24	21	6	25	23	19	15	15	11	3222	1	29
17	10	5	10	13	2	15	21	18	10	3	8	2676	..	30
6	8	5	7	8	2	17	7	11	10	1	17	1948	..	31
5	7	5	..	11	6	13	9	11	5	1	5	1375	1	32
6	11	2	5	6	6	7	4	6	7	1	2	986	..	33
5	14	1	1	4	24	4	..	5	5	..	..	703	..	34
4	7	1	2	3	22	3	..	4	..	..	2	504	1	35
2	3	1	2	..	12	3	..	2	..	..	..	301	..	36
2	4	..	..	2	12	1	1	3	..	..	..	230	..	37
2	5	..	..	..	8	2	..	..	..	..	..	119	1	38
..	3	..	..	..	6	..	..	..	..	..	1	100	..	39
..	4	..	..	..	2	..	..	..	..	..	..	62	1	40
..	4	..	..	..	..	..	..	..	..	..	..	20	2	41
..	..	..	..	..	..	..	..	..	..	..	..	14	3	42
..	..	..	..	..	..	..	..	..	..	..	..	1	..	43
120	121[3]	120	140	121	120	120	120	120	120	128	125	26335[5]	27[4]	Total number
29.40	32.07	28.10	28.01	29.17	34.13	30.13	28.76	29.78	28.39	26.85	28.26	28.77	45.19	Average

[1] 42 cm 7 spec., 51 cm 7 spec. [2] 49 cm 2 spec. [3] 46 cm 1 spec., 49 cm 2 spec., 51 cm 7 spec. [4] 45 cm 1 spec., 47 cm 2 spec., 48 cm 3 spec., 49 cm 2 spec., 50 cm 2 spec., 51 cm 1 spec., 52 cm 1 spec., 55 cm 2 spec., 56 cm 1 spec., 60 cm 1 spec.

Table XXI (continued)

Area	A 3											
Date of capture	1. VI. 19	1. VI. 19	1. VI. 19	8. VI. 19	8. VI. 19	8. VI. 19	8. VI. 19	8. VI. 19	8. VI. 19	9. VI. 19	9. VI. 19	9. VI. 19
Fishing-place	8 miles WNW of Hornum Light	At Red Cliff Sand	At Red Cliff Sand	5 miles SW of Bell Barrel	7 miles WSW of Graa Deep	5 miles N of Lister Deep	Off Manø	6 miles SW of Graa Deep Gas Buoy	7 miles SW of Graa Deep	5 miles W of List	At Red Cliff Sand	4 miles SW of Graa Dee
Depth in m	15	11	14	13	14	11	12	17	17	9	8	13
Weight of catch in kg	1800	1200	675	200	250	3000	2500	300	200	1000	1300	500
Weight of sample in kg	36.25	40	35	24.5	27	27	30	27	28.5	28.5	27	32
Length cm												
23	..	..	..	..	2	..	3	..	..	..	1	..
24	3	..	..	15	3	1	3	2	..	1	3	23
25	2	..	6	17	7	7	6	7	14	7	3	32
26	6	..	6	16	15	14	9	18	18	12	12	27
27	5	5	5	32	18	26	18	17	25	13	26	26
28	5	5	4	18	25	21	9	22	22	16	25	17
29	6	5	6	15	17	16	7	18	11	27	16	20
30	8	6	8	15	18	18	12	12	10	16	15	10
31	10	15	7	5	8	8	11	10	10	10	8	3
32	6	10	11	3	4	6	8	9	2	4	5	2
33	7	10	11	2	2	1	6	4	2	6	3	..
34	8	8	6	..	1	2	8	1	3	4	1	..
35	9	9	11	..	..	..	3	..	2	3	1	..
36	6	10	8	2	..	..	2	..	1	2	..	..
37	6	8	3	..	..	..	..	..	..	..	..	..
38	2	4	3	..	..	..	..	..	..	..	1	..
39	5	5	3	..	..	..	..	..	..	..	..	..
40	2	..	..	..	..	..	..	..	..	..	..	..
41	2	..	2	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..
43	2	..	..	..	..	..	..	..	..	..	..	..
Total number	100	100	100	100	120	120	105	120	120	121	120	160
Average length cm	32.44	33.05	32.00	27.45	28.15	28.32	29.24	28.43	28.13	29.11	28.43	26.68

Area	A 3											
Date of capture	10. VI. 19	10. VI. 19	10. VI. 19	9, 10 VI. 19	10. VI. 19	10. VI. 19	10. VI. 19	10. VI. 19	10. VI. 19	10. VI. 19	10. VI. 19	10. VI. 19
Fishing-place	At List Entrance Buoy	4 miles SW of Graa Deep	At Red Cliff Sand	6 miles NW of Lister Deep	0.5 mile N of Lister Deep Barrel	5 miles NW of List	18 miles SSW of Graa Deep	6 miles NW of List	4 miles NW by W of List	W of Red Cliff Light	At Graa Deep Gas Buoy	7 miles SW of Graa Dee Buoy
Depth in m	9	19	14	13	8	13	13	13	12	19	17	15
Weight of catch in kg	1600	1000	900	1100	1000	1400	2000	1000	1500	900	2500	300
Weight of sample in kg	20	27	27	27.5	26.25	27	27	27	28	22.5	23.75	25,5
Length cm												
23	..	1	10	..	..	1	..	..	5	..	..	..
24	6	..	27	2	1	2	..	..	25	..	2	1
25	17	10	25	..	29	10	8	6	23	5	9	8
26	20	16	19	4	29	26	9	8	20	23	14	13
27	25	21	13	12	35	25	30	34	16	18	15	18
28	15	21	11	12	25	16	18	17	15	15	15	22
29	10	16	9	11	13	15	23	23	14	28	15	18
30	3	12	5	15	6	6	12	11	5	6	10	12
31	3	4	4	10	3	7	10	10	3	3	8	15
32	1	2	6	14	2	6	5	5	7	2	7	7
33	..	10	..	5	..	3	1	1	2	..	3	1
34	..	4	3	5	..	1	4	4	4	..	2	2
35	..	3	1	5	..	2	..	1	1	..	..	2
36	..	..	..	3	..	..	1	..	..	..	..	1
37	..	..	..	2	..	..	..	..	..	..	..	..
38	..	..	1	..	..	..	..	..	..	..	..	..
39	..	..	..	..	..	..	..	..	..	..	..	..
40	..	..	..	..	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	..	..	..	..
Total number	100	120	134	100	143	120	121	120	140	100	100	120
Average length cm	26.89	28.56	26.55	30.31	27.01	27.89	28.51	28.53	26.94	27.78	28.36	28.68

A 3													Area
9. VI. 19	9. VI. 19	9. VI. 19	9. VI. 19	9. VI. 19	9. VI. 19	9. VI. 19	10. VI. 19	10.VI. 19	10. VI. 19	10. VI. 19	10. VI. 19	9, 10 VI. 19	Date
3 miles SW of Gas Buoy	3 miles WNW of Lister Deep	WNW of Red Cliff Light	18 miles SW by S of Graa Deep	2 miles SW of Graa Deep	5 miles NW of Lister Deep	1 mile SW of Graa Deep	4 miles SW of Graa Deep	At Red Cliff	4 miles SW of Graa Deep	3 miles SW of Graa Deep	2 miles NW of List	20 miles SSW of Graa Deep	Fishing-place
13	12	14	18	11	13	13	11	14	17	15	11	15	Depth
400	1000	1000	—	1500	1000	800	700	800	800	700	1700	1000	Weight of c.
24	25.5	28.5	40.5	31.5	23.75	28.5	25.5	27.5	27.5	28	26.25	26.25	Weight of s.
													Length cm
2	..	..	..	5	..	..	..	..	..	..	..	..	23
5	..	..	..	4	3	..	10	..	..	15	..	..	24
22	5	3	..	14	11	14	20	..	17	20	10	5	25
17	12	13	6	26	16	20	25	2	27	42	35	11	26
25	22	28	6	21	16	23	26	8	32	25	45	12	27
18	35	22	13	21	8	31	13	14	16	17	22	22	28
18	21	16	15	19	11	15	11	18	20	10	18	20	29
8	14	17	13	13	13	10	3	15	8	9	3	6	30
3	2	12	10	4	4	3	4	20	6	2	1	7	31
..	3	7	14	5	5	2	5	13	7	..	1	5	32
2	2	2	15	2	7	2	1	4	..	..	..	1	33
..	2	..	5	3	1	..	..	2	..	..	..	7	34
..	2	..	11	..	4	..	1	1	1	..	..	1	35
..	..	..	..	3	2	..	..	2	..	..	..	2	36
..	..	..	..	..	..	..	1	..	..	..	..	1	37
..	..	..	4	..	..	..	..	..	..	..	..	..	38
..	..	..	5	..	..	..	..	..	..	..	..	..	39
..	..	..	4	..	..	..	..	..	..	..	..	..	40
..	..	..	..	..	..	..	..	..	..	..	..	..	41
..	..	..	..	..	..	..	..	..	..	..	..	..	42
..	..	..	..	..	..	..	..	..	..	..	..	..	43
120	120	120	121	140	101	120	120	99	134	140	135	100	Total number
27.15	28.35	28.51	31.59	27.81	28.60	27.64	27.12	30.05	27.64	26.61	27.16	29.03	Average

A 3													Area
10, 11 VI. 19	11. VI. 19	11. VI. 19	11. VI. 19	11. VI. 19	11. VI. 19	11. VI. 19	11. VI. 19	11. VI. 19	11. VI. 19	11. VI. 19	11. VI. 19	11. VI. 19	Date
At Red Cliff Sand	Off List	6 miles NE of Red Cliff Light	5 miles NE of List	S of Red Cliff Bank	10 miles NW of List	4 miles W of Lister Buoy	4 miles SW of Graa Deep	3 miles SSW of Graa Deep Gas Buoy	4 miles W of Graa Deep Gas Buoy	7 miles SW by S of Graa Deep	5 miles SW of Graa Deep Gas Buoy	S of Red Cliff Sand	Fishing-place
13	13	11	11	15	12	14	11	15	16	14	13	15	Depth
1500	1200	1000	500	2500	2000	700	500	2500	400	1000	300	2000	Weight of c.
28.5	32.5	31.25	30	27.5	27	27	28.5	27	28	27	22.5	27.5	Weight of s.
													Length cm
..	..	..	..	..	..	..	..	..	3	1	25	..	23
2	..	2	3	..	2	..	2	..	13	..	40	..	24
9	..	3	10	1	10	7	5	9	33	10	26	2	25
15	7	5	1	5	20	13	12	16	30	10	22	7	26
17	9	12	20	12	32	26	23	21	17	28	13	19	27
15	13	11	17	21	20	17	22	12	15	25	14	14	28
13	7	16	16	11	15	21	19	27	13	18	4	12	29
15	6	7	16	7	6	8	17	18	4	12	4	12	30
12	14	7	15	13	1	5	7	7	5	2	..	8	31
8	10	11	9	7	2	5	5	6	3	3	..	12	32
7	9	9	6	11	5	7	3	2	..	..	1	4	33
4	9	11	4	4	3	5	3	3	2	1	..	3	34
3	6	5	..	3	3	4	2	..	2	..	..	5	35
..	3	3	4	..	1	2	..	..	..	..	..	2	36
..	3	1	..	2	..	..	..	..	..	..	..	..	37
..	2	2	..	1	..	..	..	..	..	..	..	..	38
..	..	..	..	2	..	..	..	..	..	..	..	..	39
..	1	..	..	..	..	..	..	..	..	..	..	..	40
..	2	..	..	..	..	..	..	..	..	..	..	..	41
120	101	105	121	100	120	120	120	121	140	110	149	100	Total number
28.91	31.25	30.43	29.25	30.17	28.00	28.90	28.59	28.46	26.79	27.85	25.30	29.58	Average

Table XXI (continued)

Area	A 3											
Date of capture	11. VI. 19	11. VI. 19	12, 13 VI. 19	12, 13 VI. 19	13. VI. 19	13. VI. 19	13. VI. 19	13. VI. 19	13. VI. 19	13. VI. 19	15, 16 VI. 19	15, 16 VI. 19
Fishing-place	S of Red Cliff Sand	2 miles SW of Graa Deep Gas Buoy	8 miles SW by S of Graa Deep	8 miles W of List	6 miles W of List	S of Red Cliff Sand	8 miles ESE of Hornum	SW of Graa Deep Buoy	6 miles NW of List	17 miles SSW of Graa Deep	At Amrum Bank	8 miles W of Red Cliff
Depth in m	13	15	17	13	11	17	15	15	15	16	15	13
Weight of catch in kg	500	500	600	1300	400	600	2000	3000	1000	2500	600	1100
Weight of sample in kg	28.75	25	28	26.25	28	27.5	32.5	35	28	27	25.5	26.25
Length cm												
23	..	..	..	..	5	..	1	..	..	..	..	15
24	1	5	5	16	13	..	1	..	2	6	10	17
25	1	20	25	35	25	..	2	..	3	5	15	12
26	8	21	37	32	20	4	4	4	8	11	30	15
27	13	30	30	12	21	25	11	5	10	15	15	21
28	12	20	15	25	20	15	10	6	15	25	13	15
29	7	15	14	10	12	15	11	6	11	18	8	15
30	13	10	6	6	5	14	8	13	16	15	4	20
31	12	2	5	3	2	12	3	12	10	10	8	2
32	11	..	1	1	5	5	11	8	7	5	8	5
33	4	1	1	..	5	5	10	14	8	2	7	2
34	7	1	..	..	2	2	6	12	5	3	..	1
35	3	..	1	..	3	..	5	9	..	3	1	..
36	6	..	..	..	2	2	4	1	3	1	..	..
37	2	..	..	..	..	1	5	3	1	1	..	..
38	..	..	..	..	..	..	3	4	1	..	1	..
39	..	..	..	..	..	..	2	1	..	..	..	..
40	..	..	..	..	..	..	1	2	..	..	..	..
41	..	..	..	..	..	..	2	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..
44	..	..	..	..	..	..	..	..	..	..	..	..
Total number	100	125	140	140	140	100	100	100	100	120	120	140
Average length cm	30.26	27.20	26.99	26.50	27.35	29.28	31.34	32.02	29.71	27.73	27.70	27.05

Area	A 3											
Date of capture	17. VI. 19	17, 18 VI. 19	17. VI.19	18. VI. 19	17, 18 VI. 19	18. VI. 19	18. VI. 19	19. VI. 19	19. VI. 19	19. VI. 19	18, 19 VI. 19	19. VI. 19
Fishing-place	SW of Red Cliff	2 miles SSW of Graa Deep	5 miles SW of Graa Deep Gas Buoy	At Red Cliff Sand	8 miles WNW of Graa Deep	5 miles N of Lister Deep	7 miles W of Graa Deep Light Buoy	11 miles S by W of Graa Deep	At Lister Deep	S of Red Cliff Sand	7 miles SW of Graa Deep	22 miles SW by S of Graa Deep
Depth in m	17	17	15	16	13	13	13	16	13	18	18	17
Weight of catch in kg	1300	300	800	1500	250	400	1100	1500	700	2500	350	2000
Weight of sample in kg	28.25	29	26	26.5	24.5	30	26	28	26.25	27.5	26.25	25.75
Length cm												
23	..	..	..	..	4	..	..	3	..	..	..	2
24	1	..	16	2	5	4	4	10	4	1	..	3
25	2	13	32	13	25	11	22	23	7	3	2	11
26	10	27	23	17	11	15	37	17	13	17	12	25
27	15	35	32	20	20	18	30	13	15	17	20	16
28	10	23	12	15	15	17	16	9	12	25	17	15
29	12	12	7	12	8	21	6	16	11	13	11	5
30	7	10	5	6	9	8	7	14	5	8	14	8
31	10	4	1	2	5	11	3	4	5	5	8	3
32	10	1	..	4	5	5	5	5	9	5	12	5
33	7	..	..	3	..	4	..	3	4	6	5	7
34	9	3	..	6	..	2	..	3	3	2	4	3
35	3	..	1	1	2	3	..	..	3	2	..	3
36	2	..	..	3	..	..	..	3	1	4	..	2
37	1	..	..	..	..	1	..	1	6	1	..	2
38	..	..	..	..	2	..	..	1	..	1	..	..
39	1	1	..	..	..	..	..	..	1	..	..	..
40	..	1	..	1	..	..	..	..	..	..	..	..
41	..	..	1	..	..	..	..	..	..	..	..	..
42	..	..	..	1	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	1	..	..	..
Total number	100	130	130	106	111	120	130	125	100	110	105	110
Average length cm	29.97	27.70	26.48	28.50	27.44	28.46	26.95	27.85	29.41	28.97	29.05	28.34

A 3													Area
16, 17 VI. 19	16, 17 VI. 19	16, 17 VI. 19	17. VI. 19	17. VI. 19	17. VI. 19	17. VI. 19	17. VI. 19	17. VI. 19	18. VI. 19	18. VI. 19	17. VI. 19	18. VI. 19	Date
7 miles NW of Sild	2 miles W of Graa Deep Light-ship	12 miles WSW of Amrum	1 mile SW of Red Cliff	10 miles W of Hornum	15 miles S by W of Graa Deep	NW of List	7 miles SW of Graa Deep	8 miles W by N of Graa Deep	14 miles NNW of Hornum	At Red Cliff Sand	SW of Red Cliff Sand	2 miles W of Red Cliff	Fishing-place
17	13	15	18	19	19	17	15	15	18	19	17	15	Depth
700	250	1000	400	800	2500	200	300	200	1700	800	1400	1000	Weight of c.
42.5	28.5	24.5	22.5	38.5	33.75	33	33.75	21.25	35	28.75	26.25	27.5	Weight of s.
..	..	1	..	..	..	..	..	..	..	..	..	..	Length cm
..	6	..	1	3	2	2	2	..	..	3	1	..	23
3	12	9	6	1	7	5	2	3	2	5	10	8	24
5	11	18	14	4	7	15	9	20	4	8	12	15	25
5	13	26	23	7	3	20	8	27	10	8	15	10	26
8	15	9	16	12	5	12	12	17	5	11	12	20	27
3	15	14	9	9	11	15	10	10	8	15	12	15	28
7	14	14	4	8	9	15	9	7	11	17	8	14	29
9	7	9	5	12	2	10	6	6	10	12	5	5	30
6	11	5	7	12	12	7	11	6	10	7	4	7	31
10	6	1	4	8	16	5	4	1	5	6	6	2	32
8	8	1	1	8	9	2	7	2	10	3	7	1	33
11	1	1	5	5	5	4	7	2	9	3	4	2	34
5	..	..	4	5	3	2	5	..	2	2	..	1	35
6	1	1	1	4	3	4	3	..	6	..	1	..	36
3	..	1	..	6	3	1	1	..	4	..	1	..	37
4	..	..	..	3	3	1	1	..	2	..	2	..	38
3	..	..	..	..	..	..	2	..	1	..	..	..	39
4	..	..	..	1	..	..	..	..	..	..	..	..	40
..	..	..	..	2	..	..	..	..	1	..	..	..	41
..	..	..	..	..	..	..	..	..	..	..	..	..	42
..	..	..	..	..	..	..	1	..	..	..	..	..	43
100	120	110	100	110	100	120	100	101	100	100	100	100	44
32.75	28.89	28.29	28.89	31.75	31.20	29.40	30.89	28.21	31.71	29.47	29,27	28.60	Total number
													Average

A 3												Area
19. VI. 19	19. VI. 19	19. VI. 19	19, 20 VI. 19	19. VI. 19	20. VI. 19	19, 20 VI. 19	20. VI. 19	25. VI 19	25. VI. 19	25. VI. 19	25. VI. 19	25. VI. 19	Date
16 miles SW by S of Graa Deep	5 miles SW of Graa Deep	4 miles SW of Graa Deep	20 miles SW by S of Graa Deep	Off List	3 miles SW of Graa Deep	14 miles SW by W of Graa Deep	15 miles NW of List	17 miles SW of Graa Deep	W of List	23 miles SSW of Graa Deep	24 miles SW of Graa Deep	20 miles SW of Graa Deep	Fishing-place
18	13	14	13	8	11	16	17	19	15	17	17	19	Depth
1000	100		1000	250	400	900	300	500	800	150	700	500	Weight of c.
28	28	19.5	36.75	23	22.5	22.5	29	27	35	28.75	28.75	27.5	Weight of s.
..	1	20	..	..	7	2	2	2	..	1	..	..	Length cm
5	25	33	2	2	12	13	16	5	..	3	3	2	23
12	35	21	6	18	15	27	30	22	6	12	5	5	24
19	32	20	17	25	27	16	27	21	9	13	15	11	25
29	26	19	21	25	25	28	10	21	8	17	7	15	26
26	17	13	22	18	16	13	16	10	7	10	8	10	27
11	8	3	16	8	10	10	2	6	5	8	14	15	28
8	3	..	15	5	4	4	6	6	6	7	8	7	29
9	2	..	7	3	1	1	5	8	9	5	10	10	30
3	..	..	5	3	2	3	5	4	11	5	8	7	31
2	..	..	1	3	1	1	5	2	8	8	5	8	32
..	1	1	2	2	..	1	1	7	10	6	5	4	33
1	..	..	..	2	..	..	1	4	4	3	2	4	34
..	..	..	1	..	..	1	3	1	8	4	5	2	35
..	..	..	..	..	..	..	..	1	3	2	2	..	36
..	..	..	..	1	..	..	1	..	4	1	1	..	37
..	..	..	..	..	..	..	..	..	..	..	..	..	38
..	..	..	..	..	..	..	..	..	2	..	..	..	39
..	..	..	..	..	..	..	..	..	..	..	..	..	40
..	..	..	..	..	..	..	..	..	..	..	1	..	41
..	..	..	..	..	..	..	..	..	..	..	1	..	42
..	..	..	..	..	..	..	..	..	..	..	..	..	43
125	150	130	115	115	120	120	130	120	100	105	100	100	Total number
27.68	26.17	25.35	28.27	27.59	26.56	26.74	27.18	27.97	31.27	29.12	29.92	29.35	Average

Table XXI (continued)

Area	A 3											B 4
Date of capture	26. VI. 19	25. VI. 19	25. VI. 19	25. VI. 19	25. VI. 19	25. VI. 19	27.VI. 19	26.VI. 19	26, 27 VI. 19	29.VI. 19	June 1919	9. VI. 19
Fishing-place	15 miles SW by S of Graa Deep	25 miles SW by W of Graa Deep	22 miles SW of Graa Deep	23 miles SW of Graa Deep	23 miles SW of Graa Deep	18 miles SW by S $^1/_2$ S of Graa Deep	8 miles SW of Graa Deep	20 miles SW by S of Graa Deep	5 miles S of Red Cliff Sand	25 miles SW of Graa Deep		32 miles SSW of Graa Deep
Depth in m	19	19	19	19	18	17	17	19	17	18		21
Weight of catch in kg	700	360	500	500	700	800	400	200	1000	500		3000
Weight of sample in kg	24.75	32.5	30	32.5	35	27.5	22.5	38.75	23.75	24.5		42.5
Length cm											**Total**	
23	1	..	..	..	..	..	6	..	5	20	157	..
24	7	1	..	4	..	1	26	9	12	30	588	..
25	35	5	7	7	..	4	35	10	30	25	1276	..
26	35	6	9	6	4	13	28	13	30	28	1753	5
27	31	9	7	8	7	17	20	15	17	12	2034	6
28	9	10	10	12	10	16	5	9	15	12	1684	7
29	10	9	13	13	11	10	5	10	7	6	1395	6
30	3	9	10	10	8	6	2	18	6	4	1038	4
31	3	7	8	5	12	5	1	6	1	1	718	7
32	1	10	9	7	13	6	..	9	1	1	633	10
33	..	10	7	6	7	6	..	3	1	1	439	9
34	..	9	4	5	7	5	1	..	..	..	355	6
35	..	4	6	5	6	5	1	1	..	..	258	12
36	..	2	5	5	5	2	..	5	..	..	172	5
37	..	2	1	2	3	1	..	1	..	..	100	7
38	..	2	4	2	2	..	..	..	..	..	71	9
39	..	2	..	2	3	3	..	..	..	..	52	3
40	..	3	..	1	..	..	..	1	..	..	25	4
41	..	..	..	..	2	..	..	..	..	..	17	..
42	..	..	..	..	..	..	..	..	..	..	5	..
43	..	..	..	..	..	..	..	..	..	..	3	..
44	..	..	..	..	..	..	..	..	..	..	1	..
45	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..
49	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..
57	..	..	..	..	..	..	..	..	..	..	..	..
Total number	135	100	100	100	100	100	130	110	125	140	12774	100
Average length cm	26.44	30.92	30.33	30.26	31.65	29.55	25.77	28.69	26.33	25.59	28.47	32.98

B 4												C 2	Area
17. VI. 19	16, 18 VI. 19	18. VI. 19	19. VI. 19	19. VI. 19	19. VI. 19	19, 20 VI. 19	25. VI. 19	25. VI. 19	25. VI. 19	25. VI. 19	June 1919	19 VI. 19	Date
16 miles SW by S of Hornum	Slugen	At Red Cliff Sand	18 miles SW of Graa Deep	12 miles W of Red Cliff Sand	Slugen	10 miles W of Lyngvig	18 miles SW by S of Graa Deep	15 miles SW by S of Graa Deep	16 miles SW by S of Graa Deep	12 miles W by S of Graa Deep		65 miles WSW of Graa Deep	Fishing-place
26	20	23	abt. 21	22	23	28	20	26	20	20		43	Depth
800	1000	300	800	700	1300	800	1500	1200	900	2500		300	Weight of c.
27.5	28.75	24.5	29	27.5	27.5	36.25	29.75	27.5	28.5	36.25		55.5	Weight of s.
											Total		Length cm
..	..	..	2	..	..	..	5	..	..	..	7	..	23
2	..	4	15	4	..	..	10	1	..	..	36	..	24
6	3	13	22	16	2	4	19	5	..	2	92	..	25
10	4	16	35	30	12	..	28	14	11	6	171	..	26
15	10	22	16	33	20	9	28	26	14	5	204	..	27
10	12	19	15	18	16	7	17	17	14	8	160	..	28
9	17	10	7	12	21	10	16	13	12	17	150	..	29
12	20	13	6	3	12	9	7	11	13	10	120	..	30
7	12	9	3	6	9	13	5	11	10	18	110	..	31
10	6	1	2	2	4	7	2	3	10	9	66	..	32
5	6	..	4	1	2	12	..	5	5	5	54	..	33
7	7	..	1	2	2	14	..	..	2	3	44	2	34
4	2	2	1	1	..	7	2	4	3	4	42	..	35
..	..	1	..	1	..	8	..	..	..	4	19	2	36
2	..	..	1	..	..	..	..	..	1	5	16	..	37
1	1	..	..	..	..	..	1	..	4	3	19	2	38
..	1	..	..	..	..	..	..	..	1	3	8	8	39
..	..	..	..	..	..	..	..	..	..	2	6	4	40
..	..	..	..	..	..	..	..	..	..	..	..	8	41
..	..	..	..	..	..	..	..	..	..	..	..	4	42
..	..	..	..	..	..	..	..	..	..	..	..	2	43
..	..	..	..	..	..	..	..	..	..	..	..	4	44
..	..	..	..	..	..	..	..	..	..	..	..	4	45
..	..	..	..	..	..	..	..	..	..	..	..	4	46
..	..	..	..	..	..	..	..	..	..	..	..	2	47
..	..	..	..	..	..	..	..	..	..	..	..	6	48
..	..	..	..	..	..	..	..	..	..	..	..	2	49
..	..	..	..	..	..	..	..	..	..	..	..	2	50
..	..	..	..	..	..	..	..	..	..	..	..	2	52
..	..	..	..	..	..	..	..	..	..	..	..	2	57
100	101	110	130	129	100	100	140	110	100	104	1324	60	Total number
29.56	29.95	27.82	26.89	27.37	28.60	31.31	27.08	28.55	29.90	31.26	29.10	43.47	Average

DANSK RÉSUME.

A. C. Johansen og *Kirstine Smith*: Undersøgelser angaaende den Indflydelse, som den ved Krigen foraarsagede Indskrænkning i Fiskeriet har haft paa Rødspættebestanden i den østlige Del af Nordsøen.

I. Rødspættefiskeriet i Nordsøen under Krigen.

Som almindelig bekendt medførte den længe vedvarende Verdenskrig store Indskrænkninger i Fiskeriet i de fleste europæiske Farvande, og i ikke ringest Grad gjaldt dette for Nordsøen. Mangfoldige Fiskere var indkaldte til Krigstjeneste. Talrige Fiskefartøjer blev under Krigen anvendt i militære Øjemed, til Observationstjeneste, Mineoptagning etc., og andre blev ødelagte eller hindrede i at drive Fiskeri ved de maritime Krigsoperationer. En meget væsentlig Indskrænkning i Udøvelsen af Fiskeriet foraarsagedes ogsaa ved omfattende Mineudlægninger og Afspærringer af store Dele af Farvandene. Hertil kom, at der i adskillige Lande under den senere Del af Krigen var en stærk Mangel paa Brændselsolie til Motorfartøjer i Forbindelse med Mangel paa Fiskeredskaber, og endelig bragte de ofte vanskelige Afsætningsforhold for de neutrale Landes Vedkommende store Forstyrrelser i Fiskeriet. Under en stor Del af Krigen ansporede paa den anden Side de abnormt høje Priser paa Fiskeriprodukter til at drive Fiskeriet med stor Kraft, hvor dette var muligt.

For Rødspættefiskeriet i Nordsøen viser de foreliggende statistiske Oplysninger, at der under Krigen er foregaaet en mægtig Nedgang i Fangsten. Det samlede Udbytte, der i de nærmeste Aar før Krigens Udbrud var ca. 50 Millioner Kilogram, gik i Aarene 1915—17 ned til ca. Halvdelen heraf.

I Tabel I Side 3 er der givet en Oversigt over Udbyttet i Aarene 1903—1918 for de forskellige deltagende Landes Vedkommende. For Tyskland, Belgien, England og Skotland er Oversigten ufuldstændig.

Den officielle tyske Fiskeristatistik har ikke været os tilgængelig for noget Aar siden 1914. Af forskellige i tyske Fiskeriskrifter offentliggjorte Meddelelser kan det dog ses, at der i det hele fra tysk Side er fisket langt mindre i Nordsøen under Krigen end sædvanligt.

For Belgiens Vedkommende kan det sikkert sluttes, at Rødspættefiskeriet i Nordsøen i de senere Krigsaar ganske er standset. Helt anderledes har Forholdene været i Holland, der er det eneste af de til Nordsøen grænsende Lande, hvis Fangst af Rødspætter under Krigen har været lige saa stor som i Aarene umiddelbart forud for Krigen.

Som det fremgaar af Tabel I Side 3 var Englands Fangst af Rødspætter i Nordsøen gaaet stærkt nedad i Perioden 1903—10. I de 4 Aar 1910—13 holdt Udbyttet sig nogenlunde konstant mellem 25 og 27 Millioner Kilogram om Aaret, men i 1914 dalede Udbyttet ned til 20.5 Millioner Kilogram. Tallene i Tabel I for Aarene 1915—18 omfatter alle Rødspætter ilandbragte i England og Wales. Selv om vi antager, at de fleste af disse Rødspætter stammer fra Nordsøen, har Nedgangen i Udbyttet været meget stor. Totalmængden af de ilandbragte Rødspætter beløber sig i Aarene 1915—17 kun til 9—11,5 Millioner Kilogram pr. Aar.

Det danske Rødspættefiskeri i Nordsøen foregaar aldeles overvejende i den nordlige Del af de internationale Felter A_3 og B_4 (Se Kortet Fig. 1). Eksempelvis kan anføres, at Fordelingen af Udbyttet (i kg) af Danmarks Fangst af Rødspætter i Nordsøen i Aaret 1910 var følgende:

A_3	B_4	A_4	B_5	C_2
71.5 %	22.5 %	1.4 %	3.7 %	0.9 %

Da vore Undersøgelser angaaende Størrelsen af de fra Nordsøen ilandbragte Rødspætter ogsaa i Hovedsagen angaar den nordlige Del af Felterne A_3 og B_4 mellem 54°30′ og 56°0′ N. Br., vilde det være af Betydning at kende Udbyttet af Rødspættefiskeriet i disse Felter under Krigen og en Aarrække forud for denne.

Nogen Statistik over Totalfangsten af Rødspætter i disse Felter haves ikke, men man faar et Begreb om Fangstens Størrelse ved at addere Udbyttet af det danske Rødspættefiskeri i Nordsøen til Udbyttet af det engelske Fiskeri i de to Felter A_3 og B_4 (se Tabel I). Af det nævnte Udbytte fra dansk Side stammer kun nogle faa Procent fra andre Felter end den nordlige Del af A_3 og B_4, og af det engelske Udbytte i A_3 og B_4 hidrører den langt overvejende Mængde fra den nordlige Del af disse Felter (Nord for 54°30′ N. Br.). Adderes det nævnte Udbytte, faas følgende Resultater for

Udbyttet af det danske og det engelske Rødspættefiskeri i de to Felter A_3 og B_4:

1906	8.623.000 kg.	1913	10.685.000 kg.
1907	12.391.000 »	1914	8.752.000 »
1908	7.247.000 »	1915	9.820.000 »
1909	8.326.000 »	1916	5.778.000 »
1910	6.993.000 »	1917	2.184.000 »
1911	5.889.000 »	1918	2.897.000 »
1912	9.920.000 »		

Det fremgaar heraf, at der i 1916 spores et stærkt Fald i Fangstens Størrelse i den nordlige Del af A_3 og B_4, og at Udbyttet i 1917 og 1918 kun var henholdsvis ca. $^1/_4$ og $^1/_3$ af det normale. Den engelske Fangststatistik for A_3 og B_4 viser for Aarene 1906—09 et langt højere Udbytte end for Aarene 1910—12. I Følge A. T. Masterman hidrører dette fra, at man fra engelsk Side i ringere Grad har befisket disse Grunde i sidstnævnte Periode end i førstnævnte. Sandsynligvis er Fiskeriet i disse Omraader fra engelsk Side ogsaa drevet mindre intensivt i 1913—14 end i 1906—09. Man tør da sikkert regne, at der i Perioden efter 1910 aarlig er fanget og ødelagt langt mindre Mængder af Undermaalsfisk fra Damptrawlere i den nordlige Del af A_3 og B_4 end i den foregaaende Periode.

I den nordlige Del af A_3 og B_4 (N. f. 54°30′ N. Br.) foregaar der ogsaa Fiskeri efter Rødspætter fra Tysklands og Hollands Side. Udbyttet af dette Fiskeri er ikke kendt, men det overstiger for Tysklands Vedkommende næppe 1 Million kg pr. Aar, selv under normale Forhold, og for Hollands Vedkommende drejer det sig kun om en langt ringere Fangst. At der fra disse Lande er fisket mindre i det nævnte Omraade under Krigen end i Aarene umiddelbart forud for Krigen, er utvivlsomt.

II. Statistiske Undersøgelser angaaende Længden af Rødspætter ilandbragte i Esbjerg.

Fra tre forskellige Perioder foreligger der Maalinger af Prøver af de i Esbjerg fra Nordsøen ilandbragte Rødspætter, nemlig fra Aarene 1904—06, 1916 og 1919. Den første Serie af Maalingerne er saaledes foretaget en Del Aar forud for Verdenskrigen, den anden midt under Krigen og den tredie umiddelbart efter Krigens Slutning. Resultatet af Maalingerne i 1904—06 er offentliggjort i "Meddelelser fra Kommissionen for Havundersøgelser" Bd. III No. 8 1910, medens Resultaterne af Maalingerne i 1916 og 1919 findes i Tabel XXI i nærværende Afhandling. Maalingerne er foretaget af lejet Mandskab under Fiskerikontrollens Tilsyn[1]. Man har bestræbt sig for at udvælge Prøverne til Maaling saaledes, at Materialet bliver saa repræsentativt som muligt: Prøverne er i størst Antal taget fra Fangsten paa de Grunde, der til enhver given Tid har været befisket af de fleste Fartøjer. De Rødspætter, der ilandbringes i Esbjerg, er næsten altid levende og opbevares i Dam. Fra Dammen optages lige for Haanden ved Hjælp af Ketser en Prøve af levende Fisk til Maaling, i Reglen 100 à 150 Stykker. De ilandbragte Fisk sorteres ikke efter Størrelse, forinden Salget foregaar, men en Sortering finder derimod Sted umiddelbart efter Fangsten, førend Fisken anbringes i Dammen. Ved denne Sortering paavirkes Antallet af de ilandbragte Individer under 27 cm i Reglen stærkt. De smaa Fisk, som det enten er ulovligt at ilandbringe, eller som det ikke kan betale sig at ilandbringe, kastes overbord.

[1] For det Arbejde, der her er ydet, skylder vi en Tak til Fiskeridirektør Mortensen og Fiskeribetjent Tæbring.

De af os i 1919 foretagne Maalinger, hvoraf Resultaterne er offentliggjort i Tabel XXI, er udført i Tiden fra April til Juli, da et Mindstemaal af 24 cm Totallængde har været i Kraft. Det gældende Mindstemaal i de to foregaaende Maaleperioder, 1904—06 og 1916, var 25.6 cm Totallængde.

I Overensstemmelse med Størrelsen af Udbyttet i de forskellige Felter er de fleste Maalinger udførte paa Prøver fra Fangster taget i A_3 (0—20 m), og et mindre Antal fra B_4 (20—40 m). Kun ganske enkelte maalte Prøver stammer fra C_2 (40—60 m). Fra Aaret 1919 har vi hidtil kun bearbejdet Materialet fra de tre Maaneder April, Maj og Juni. Kun Materialet fra de tilsvarende Maaneder i 1904—06 og i 1916 er taget i Betragtning ved Sammenligningen af Fiskens Størrelse. Af Hensyn til, at Antallet af store Rødspætter tiltager stærkt med Dybden (se Tabel V Side 11), og paa Grund af, at der fra visse Maaleperioder kun foreligger ganske enkelte Prøver af Fisk taget paa mindre end 8 Meters Dybde, har vi fundet det praktisk at dele A_3 i to Underafdelinger: $A_{3,\,a}$, der omfatter Dybder under 8 m, og $A_{3,\,b}$, der omfatter Dybder fra 8—20 m (Se Figur 1). Som Grundlag for en rent foreløbig Sammenligning har vi adderet alle Prøverne taget i samme Maaned indenfor de enkelte Perioder og beregnet Antallet for hver Centimeters Længde pr. 1000 Individer. Resultatet er opført i Tabel IV Side 10. Det vil ses af denne Tabel, at medens Rødspætter under 27 cm i Maj og Juni 1904—06 udgjorde ca. 42 Procent af Totalantallet, udgjorde de i de tilsvarende Maaneder i 1916 og 1919 kun ca. 30 Procent af Totalantallet.

Betragter vi de Søjler i Tabel IV, der viser Forskellen i Hyppigheden for hver Centimeters Længde i de forskellige Perioder, ser vi, at for Størrelser over 29 cm er der i det hele en Tiltagen i Hyppigheden fra en Periode til den følgende. Dette viser sig meget slaaende, naar man betragter den Linie i Tabellen, der angiver Antallet af Individer paa over 30 cm. Denne Sum er for Maj Maaned, hvorfra det bedste Materiale foreligger, steget fra 130 Promille i 1904—06 til 294 Promille i 1916 og videre til 343 Promille i 1919.

Den iagttagne Forskel i Størrelse kan ikke forklares ved, at de Dybder indenfor A_3, hvorpaa Fisken er taget, har været forskellige i de tre Perioder. Tværtimod er Gennemsnitsdybden paa de Grunde, hvorfra Prøverne hidrører, mindre i 1916 end i 1904—06 og igen mindre i 1919 end i 1916. Da Oversigten i Tabel V Side 11 viser, at Antallet af større Fisk (over 33 cm) tiltager stærkt med Dybden, kan man slutte, at Størrelsesforskellen vilde være traadt endnu stærkere frem, hvis man i de tre Perioder havde fisket paa de samme Dybder.

Spørgsmaalet er nu, om den iagttagne Forskel i Størrelse af de ilandbragte Rødspætter i de tre Perioder kan forklares alene ved en Forskel i Sorteringen eller om den delvis skyldes en Forandring i selve Bestanden.

For at afgøre dette Spørgsmaal har vi undersøgt den Del af Prøverne, der ikke paavirkes ved Sorteringen, nemlig Individerne over en vis Størrelse. Af Tabel IV ser vi, at Maksimalhyppigheden i de forskellige Perioder findes ved 26 eller 27 cm, i et enkelt Tilfælde mellem 27 og 28 cm. Dette giver et godt Holdepunkt for den Antagelse, at den Fisk, der er over 27 cm, ikke i nogen af Perioderne er paavirket af den Sortering, der finder Sted umiddelbart efter Fangsten før Ilandbringelsen. Det er ogsaa paa Forhaand usandsynligt, at man efter Fangsten skulde bortkaste Fisk, der er et Par Centimeter eller mere over det alment gældende danske Mindstemaal. Vi gaar derfor ud fra, at den Del af Prøverne, der omfatter Fisk paa mere end 27 cm, i alle tre Perioder giver et lige godt Billede af selve Bestanden. — I Tabellerne VI—VIII S. 13—14 og i Figurerne 3—5 er der foretaget en Sammenligning mellem Størrelsesfordelingen af Rødspætter paa over 27 cm fra Feltet A_3 i de tre Perioder 1904—06, 1916 og 1919. Beregningen er udført paa den Maade, at Fordelingen af Individer over 27 cm for hver Prøve er udregnet pr. 1000 Individer. Vi kan da behandle Hyppighederne i forskellige Prøver af en vis Længde over 27 cm som forskellige, gentagne Observationer, kan finde deres Middelværdi og Middelafvigelse og Middelfejlen paa Middelværdien.

Den foretagne Sammenligning viser, at der ogsaa for denne Gruppe af Fisk er en stærk Tiltagen i Hyppigheden af de større Individer. Betragter man Tabellen for Maj Maaned (Tabel VII, Felt $A_{3,\,b}$), vil man se, at den relative Hyppighed af Individer over 33 cm fra 1904—06 til 1916 er vokset til det tredobbelte og fra 1916 til 1919 igen til det dobbelte. Størrelsen af Middelfejlen paa Differensen viser, at denne Tiltagen er utvivlsom. Tabellerne VI og VIII for henholdsvis April og Juni er baseret paa et Materiale af ringere Omfang end Tabel VII (for Maj), men Resultatet af Sammenligningen for de tre Perioders Vedkommende peger ganske i samme Retning. For April Maaned kan det med Sikkerhed sluttes, at der er en stærk Tiltagen i den relative Hyppighed af de større Individer fra 1904—06 til 1919, saavel som fra 1916 til 1919. For Juni Maaned ser vi ligeledes en utvivl-

som Forskydning i samme Retning fra 1904—06 til 1919. En Sammenstilling af Hyppighedsfordelingen af Individer mellem 27—30, 30—33 og over 33 cm for April, Maj og Juni i A_3, $_b$ er foretaget i Tabel IX, som gengives her. Det foreliggende Maalemateriale fra de tre Perioder viser saaledes med stor Sikkerhed, at selve Rødspættebestanden har forandret sig væsentligt i de to Tidsrum mellem disse Perioder. De store Rødspætter paa over 33 cm Længde har udgjort en fra hver af de to første Perioder til den følgende stærk stigende Procentdel af de Individer, der ikke underkastes nogen Sortering.

Hyppigheden af Rødspætter over 27 cm i A_3 beregnet pr 1000 Individer.
(Gennemsnitlig Dybde i Parentes.)

Længde cm	27—30			30—33			over 33		
Maaned	April	Maj	Juni	April	Maj	Juni	April	Maj	Juni
1904—06	812 (15)	773 (15)	787 (17)	160	194	179	28 ± 11	32 ± 6	35 ± 12
1916	763 (11)	597 (14)	569 (17)	202	301	295	36 ± 7	102 ± 17	136 ± 61
1919	638 (10)	461 (11)	584 (15)	289	307	256	74 ± 13	233 ± 24	159 ± 14

Som allerede anført (Side 50) udgjorde Individerne paa under 27 cm en langt større Procent af den samlede Fangst i Maj og Juni 1904—06 end i de tilsvarende Maaneder i 1916 og 1919. En af Aarsagerne hertil er aabenbart at finde umiddelbart i den Forandring, Bestanden er undergaaet, nemlig den stærkt forøgede relative Hyppighed af store Rødspætter paa over 30 cm Længde. Men en anden Aarsag er utvivlsomt en deraf følgende uensartet Sortering af Fisken. Naar det er let at fiske en Last af store Fisk, betaler det sig ikke at bringe store Mængder af smaa Fisk paa Markedet. Jo mere sparsomt den store Fisk optræder, i desto højere Grad tvinges Fiskerne til at tage til Takke med de smaa.

III. Undersøgelser angaaende Forandringer i Rødspættebestandens Størrelse i Feltet A_3.

I Tabel XII Side 20 er der givet en Oversigt over Fangsten af Rødspætter pr. Rejse og pr. Fiskedag i Feltet A_3 i Maj 1916 og Maj 1919. Tabellen viser, at Gennemsnitsfangsten pr. Rejse har været omtrent den samme i Feltet A_3, $_b$ i de to Aar, men at Rejsens Varighed gennemsnitlig har været betydelig kortere i 1919 end i 1916. Ser vi paa Gennemsnitsfangsten pr. Fiskedag har denne i Maj 1919 været ca. 300 kg større end i Maj 1916, hvad der svarer til en Forøgelse af 32 Procent.

Statistikken over Fangsten af Rødspætter i Maj 1919 er endnu ikke bearbejdet, men der er ingen Tvivl om, at Antallet af Fartøjer, der har deltaget i Fiskeriet i A_3, er steget stærkt fra Maj 1916 til Maj 1919. Det maa derfor anses for berettiget at drage den Slutning, at naar Fangsten pr. Fiskedag i Area A_3, $_b$ i Maj 1919 var 1.32 Gange saa stor som i Maj 1916, saa er Bestanden af Maalsrødspætter paa Grundene i den mellemliggende Periode vokset med mere end 32 Procent i Vægt.

For at faa en Forestilling om den tilsvarende Forandring i Antallet af Rødspætter har vi beregnet Vægten pr. Snes af de i de forskellige Perioder maalte Rødspætter. Herved er vi i Stand til at finde Antallet af Individer indeholdt i 100 Kilogram Rødspætter (Se Tabel XIII Side 20). Ud fra det herved fundne Antal og ved Hjælp af Tabel IV, der angiver Længdefordelingen, har vi beregnet Antallet af Individer over 27 cm og Antallet mellem 27 og 28 cm der indeholdtes i 100 kg (se Tabel XIV og XV). Medens de Værdier i de nævnte Tabeller, som angaar Maj 1916, kun omfatter A_3, $_b$, hidrører Værdierne for Maj 1919 fra Prøver stammende saavel fra A_3, $_a$ som fra A_3, $_b$. For A_3, $_b$ alene er Antallet af Individer i 100 kg Rødspætter 346, af hvilke 43 har en Længde mellem 27 og 28 cm og 288 en Længde over 27 cm. De tilsvarende Tal for Maj 1916 er 407, 63 og 286. — Hvis vi gaar ud fra den Forudsætning, at Vægten af Maalsrødspætter i A_3, $_b$ fra Maj 1916 til Maj 1919 er tiltaget med 32 %, kan man heraf slutte, at Antallet af saadanne Rødspætter er tiltaget med 12 % og Antallet af Rødspætter over 27 cm alene med 33 Procent. Denne Forøgelse viser sig paa følgende Maade for de forskellige Størrelsestrin:

For Antallet af Rødspætter fra 27—30 cm er Tilvæksten ..... 0 %
- - - - - 30—33 - - - ..... 34 %
- - - - over 33 - - - ..... 201 %

Samtidig med denne stærke Forøgelse i Antallet af de større Rødspætter er Antallet af de mindre Individer paa under 27 cm aftaget med 36 %, medens Antallet af Individer mellem 27 og 28 cm er aftaget med 10 %. Denne Nedgang i Antallet af de mindre Rødspætter i Fangsterne fra $A_{3, b}$ behøver dog ikke at betyde, at disse faktisk var tilstede i ringere Antal paa Fiskegrundene i Maj 1919 end i Maj 1916. Den Omstændighed, at der i 1919 var saa store Mængder af de større Rødspætter i Sammenligning med 1916 har efter al Sandsynlighed bevirket, at man har foretaget Sorteringen paa forskellig Maade i de to Aar. Naar det er let at fange stor og værdifuld Fisk, vil Fiskerne ikke være tilbøjelige til at tage saa mange Smaafisk med i Fangsten, som naar den store Fisk kun optræder i meget ringe Mængde.

Den fundne Nedgang i Antallet af Rødspætter paa 27—28 cm kan ikke forklares paa samme Maade. Men vi har, af Mangel paa Oplysninger om Fiskeriets Intensitet, maattet regne med en Minimumsværdi for Tilvæksten af Rødspætter fra 1916 til 1919, som sikkert er en Del under den faktiske Tilvækst. Vi mener derfor, at det er en rimelig Antagelse, at der i det mindste har været lige saa mange Rødspætter paa 27—28 cm i Maj 1919 som i Maj 1916, og giver i Fig. 7 med denne Forudsætning en Fremstilling af Hyppighedsfordelingen af Rødspætter over 27 cm Længde for alle Maaleperioder.

IV. Rødspættens Vækst i Feltet A_3 i de senere Aar sammenlignet med Væksten omkring Aarene 1904—1907.

I Tabel XIX Side 24 er der sammenstillet en Oversigt, der viser Gennemsnitslængden og den procentvise Fordeling af Individer af forskellige Aldersgrupper i den nordlige Del af Feltet A_3 i Prøver fra Aarene 1904, 1907, 1915 og 1919. Kun Individer paa over 27 cm Længde, der maa antages at være uberørte af Sorteringen, er medtaget. Aldersbestemmelserne støtter sig paa Undersøgelser af Rødspættens Ørestene (Otolither). Tabellen viser dels, at de ældre Aldersgrupper (V—VIII) i Aarene 1915 og 1919 udgør en meget større Procentdel af Fisken end i Aarene 1904 og 1907, og dels, at Gennemsnitslængden af en given Aldersgruppe er meget mindre i 1915—19 end i 1904—07. Hvis de undersøgte faa Prøver giver et nogenlunde paalideligt Billede af Forholdene indenfor større Omraader, kan man slutte, at den Tiltagen i Størrelsen af Rødspætter i A_3, som er paavist i Kapitel II, skyldes en tiltagende Hyppighed af de ældre Aargange af Fisken, der mere end opvejer den paaviste Aftagen i dens Vækshastighed.

Tabel XX viser, at Rødspætter af 24—30 cm Længde i Aarene 1904 og 1907 var henholdsvis 2.5 og 2 Aar yngre end Rødspætter af samme Længde i Aarene 1915 og 1919. Det fremgaar af Otolith-Undersøgelserne, at Vækshastigheden for de fleste af de undersøgte Individer har været meget langsom i en Aarrække forud for 1915 og 1919.

Den langsomme Vækst i de senere Aar i Sammenligning med Væksten i Aarene omkring 1904—07 maa være en Følge af sparsom Ernæring, og naar vi betænker den langt større relative Hyppighed af de ældre Aargange i de senere Aar i Sammenligning med Forholdene i 1904 og 1907 (se Tabel XIX), kan der næppe være Tvivl om, at de daarlige Ernæringsbetingelser for de enkelte Fisk skyldes en meget tættere Rødspætte-Population i den nordlige Del af A_3 i de senere Aar end i Aarene omkring 1904—1907. Der er Grund til at antage en Sammenhæng mellem dette Forhold og det aftagende Trawlfiskeri i det nævnte Omraade efter 1910 samt den delvise Fredning, der var en Følge af Krigen. Der er ogsaa den Mulighed, at den aarlig tilkommende Mængde af Yngel i den nordlige Del af A_3 gennemsnitlig var større i Perioden omkring 1915—1919 end i Perioden omkring 1904—07.

V. Slutningsbemærkninger.

I en længere Aarrække forud for Verdenskrigens Begyndelse blev der fra en Række forskellige Landes Side anstillet Undersøgelser med Hensyn til Spørgsmaalet om, hvorvidt Rødspættebestanden i Nordsøen og tilgrænsende Farvande havde forandret sig som Følge af den mægtige Udvikling i Havfiskeriet, der havde fundet Sted siden Midten af forrige Aarhundrede. Meningerne om dette Spørgsmaal var i lang Tid meget delte, men efter at der særlig ved det internationale Samarbejde i Aarene 1903—1912 var tilvejebragt en Række af nye Fakta, der med iøjnefaldende Tydelighed pegede hen paa en Forandring af Bestanden, enedes næsten alle Forskere om at antage en saadan og at sætte den i Forbindelse med den stærke Udvikling af Fiskeriet. Forandringen viste sig fornemmelig ved,

at Antallet af store Rødspætter udgjorde en stadig ringere Del af Fangsterne, medens Procenttallet af smaa Rødspætter var stærkt tiltagende.

I Tilslutning til de gjorte Erfaringer før Krigens Begyndelse maatte det anses for meget ønskeligt at anstille Iagttagelser med Hensyn til, hvorledes Rødspættebestanden i Nordsøen vilde forholde sig i en Periode, hvor Fiskeriet dreves med meget mindre Intensitet end sædvanligt. En saadan Periode indtraf under Krigen, og vi har nu gjort den Erfaring, at Antallet af store Rødspætter atter er tiltaget stærkt baade relativt og absolut, medens Procenttallet af smaa Rødspætter i Fangsterne er aftaget i de af os undersøgte Omraader (særlig den nordlige Del af A_3). Vore Aldersanalyser peger bestemt i Retning af, at den almindelige Tiltagen i Rødspættens Størrelse skyldes en forøget Hyppighed af de ældre Individer, medens Væksthastigheden samtidig er aftaget. Resultaterne af den foretagne Undersøgelse tyder saaledes paa, at naar man forud for Krigen var tilbøjelig til at sætte de omtalte Forandringer i Rødspættebestanden i Nordsøen i Forbindelse med den iagttagne Stigning i Fiskeriets Intensitet, saa har dette været berettiget, og de viser tillige med stor Bestemthed, at selv en relativt kortvarig Formindskelse i den Intensitet, hvormed Rødspættefiskeriet sædvanlig drives i Nordsøen, sætter sig stærke Spor i Retning af en Forøgelse af Antallet af de større Fisk.

Den ved Krigen fremkaldte »Fredning« af Rødspætten i Nordsøen har virket som et storstilet Eksperiment. Der er ingen Tvivl om, at Rødspættebestanden som Følge af denne Fredning er vokset kendeligt, saaledes at dens Ydeevne nu for en Tid vil være større, end den har været i adskillige Aar før Krigens Begyndelse. Om den paagældende »Fredning«, der jo har været ganske planløs, vil vise sig at være en Fordel fra et fiskerimæssigt Synspunkt, er et andet Spørgsmaal. I de fem Krigsaar fra 1914—1918 har det samlede Udbytte af Rødspættefiskeriet i Nordsøen været ca. 90—100 Millioner Kilogram mindre end i de fem sidste Aar før Krigens Begyndelse. Det vil være af Interesse at erfare, om denne store Nedgang i Udbyttet vil blive fuldstændigt opvejet i Vægt eller Værdi af et fremtidigt Merudbytte, naar Fiskeriet i Nordsøen atter bliver drevet med en lignende Intensitet som i Aarene forud for Krigen. Vi drister os ikke til at fremkomme med nogen Spaadom i denne Retning.

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